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CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

OFFICIAL NOTICE—
Experience Section, Pacific Coast Gas Association..... 49

EDITORIALS—
Briefly Told 49
Annual Meeting, British Institution of Gas Engineers—Fifth Annual Meeting, Society of Gas Engineering, New York City—Current Mention.
*Group Photograph, Canadian Gas Association..... 50
Review of the Twenty-Fifth Annual Report, Massachusetts Board of Gas and Electric Light Commissioners—No. III..... 50
*Sketch of New Offices, Tacoma (Wash.) Gas Light Company..... 51
Gas Franchises and Privileges: Their Legal Characteristics and Constructions which the Courts have Placed Upon Them.—No. II., by Mr. John Edson Brady..... 51
*The Careful Engineer and Fireman, by "Engineer"..... 52
Municipal Electric Light and Power Stations 53
Rules and Regulations Governing Inspection of Gas, Public Service Commission, Second N. Y. District. 54
*A Six Inch Steam Valve. 56
Lights Far Out to Sea 56
Annual Report, Chief Inspector, English Factories and Workshops 57
Central Station Electric Rate Factors, Wisconsin..... 58
*Machine Banded Continuous Stave Wood Water Pipe 60
Fuel Calorimetry 61
Report of Refractory Materials Committee..... 61
*Tower Lights, by "R."..... 63
ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 63
Extending Mains, Superior, Wis.—The Kelsey-Brewer Syndicate in Control, Kankakee, Ills.—Personal—Seeking New Territory, Taunton, Mass.—Mr. Searles Looks Forward—Extending at Fort Worth, Tex.—Cheaper Gas for Charlestown, Mass.—Annual Meeting, Evansville, Ind.—Combination, Easton, Pa.—Mr. Barret at His Ease—Death of Mr. P. C. Redlington—Death of Mr. Moses Byrne—A Mortgage—Revised Gas Rate, Baltimore, Md.—Schenectady Company's New Business Quarters—Testimonial to Mr. G. H. Finn—The Difference in Experts—More Rumors from Nashville, Tenn.—Supt. Bullock's Good Work—New Machinery, Shamokin, Pa.—And Other Items.
The Market for Gas Securities. 65
Meeting Times of the Various Gas Associations 69
Public Lighting Tables for June, 1910..... 78

[OFFICIAL NOTICE.]

Experience Section, Pacific Coast Gas Association.

OFFICE OF THE EXPERIENCE EDITOR,
ROOM 610, 445 SUTTER STREET,
SAN FRANCISCO, CAL., June 26, 1910.

To the Members of the Pacific Coast Gas Association: Someone has said that "Education is not the result of a course of study; it is the result of a course of experience." And the Editor of your Experience Department, whom you honored by that appointment at the last meeting, would like to have you share with him a bit of experience that has helped to make you successful, so that he can tell it to the Association at the Los Angeles meeting, which is so near at hand—September 20, 21 and 22. The name of the sender will be treated confidentially, if so desired.

Faithfully yours,
LEON B. JONES, Editor.

AT a special meeting of the Board of Directors of the New York and Richmond Gas Company (Staten Island), Mr. W. J. Welsh was elected to the vacancy in the Board, occasioned by the death of Mr. Thomas O. Horton.

BRIEFLY TOLD.

ANNUAL MEETING, BRITISH INSTITUTION OF GAS ENGINEERS.—The annual general meeting of this sterling engineering body was held in the rooms of the British Institution of Mechanical Engineers, Storey's Gate, London, S.W., commencing the 14th ult. The proceedings were directed (and most ably) by the President, Mr. James W. Helps, of Croydon, and it is needless to say that, under his capable managing, nothing was left undone that should have been done. The weather was good, the attendance was well above the average, the technical matter was both interesting and diversified, the pervading and prevailing sentiment was of the nicest fraternal type, and the net result was a meeting that will stand comparison with those that preceded it, without suffering through the comparing. The technical programme was noteworthy to workers in the American gas field through the contribution, by Mr. J. B. Klumpp, of Philadelphia, whose presentation of matter of "Gas Calorimetry in the United States," was a most interesting compendium. It was regretted on all sides that the author was not present to read his findings, but he had a worthy representative in the person of Dr. Harold G. Colman, whose researches along the indicated lines have made him famous in more fields than that of the gas industry. The officers elected were: President, Mr. Alexander Wilson, Glasgow; Vice-Presidents, Mr. R. G. Shadbolt and Mr. J. Ferguson Bell, of Derby; Hon. Secy., Mr. S. Y. Shoubridge. Amongst the visitors from this side were Mr. C. H. Nettleton and Mr. de Burgi, whose reception was of the real fraternal sort. The next meeting will be held in Glasgow.

FIFTH ANNUAL MEETING, SOCIETY OF GAS ENGINEERING, NEW YORK CITY.—On Thursday, June 23d, the fifth annual meeting of this Society was held at the plant of the Astoria (L. I.) Light, Heat and Power Company. Following the example set by the meeting of a year ago, this was also made an out-of-doors meeting. So, besides the usual business session, a game of base ball and a minstrel show further occupied the attention of the members. After the base ball match, which was won by the "Odds," assisted by some of the honorary members of the Society, against the "Evens," also assisted by some of the Society's guests, the photograph (see p. 50) of those attending was taken. Here followed the business session, followed by a dinner set out on the green at the south end of the plant. As soon as the cigars had been put in commission the tables were removed and the members and guests were treated to a minstrel performance gotten up entirely and solely impersonated by members of the Society. It was held on a well arranged stage, equipped with scenery, drop curtain, footlights and spotlight. Though the afternoon was warm, the evening brought a favorable change in the wind and no further discomfort was experienced from the trying weather conditions of this day and the days which had preceded it. The Society was also favored with the presence of a large number of the Company's officers as invited guests, together with many friends of the members, about 100 members and 50 invited guests being present.—L.

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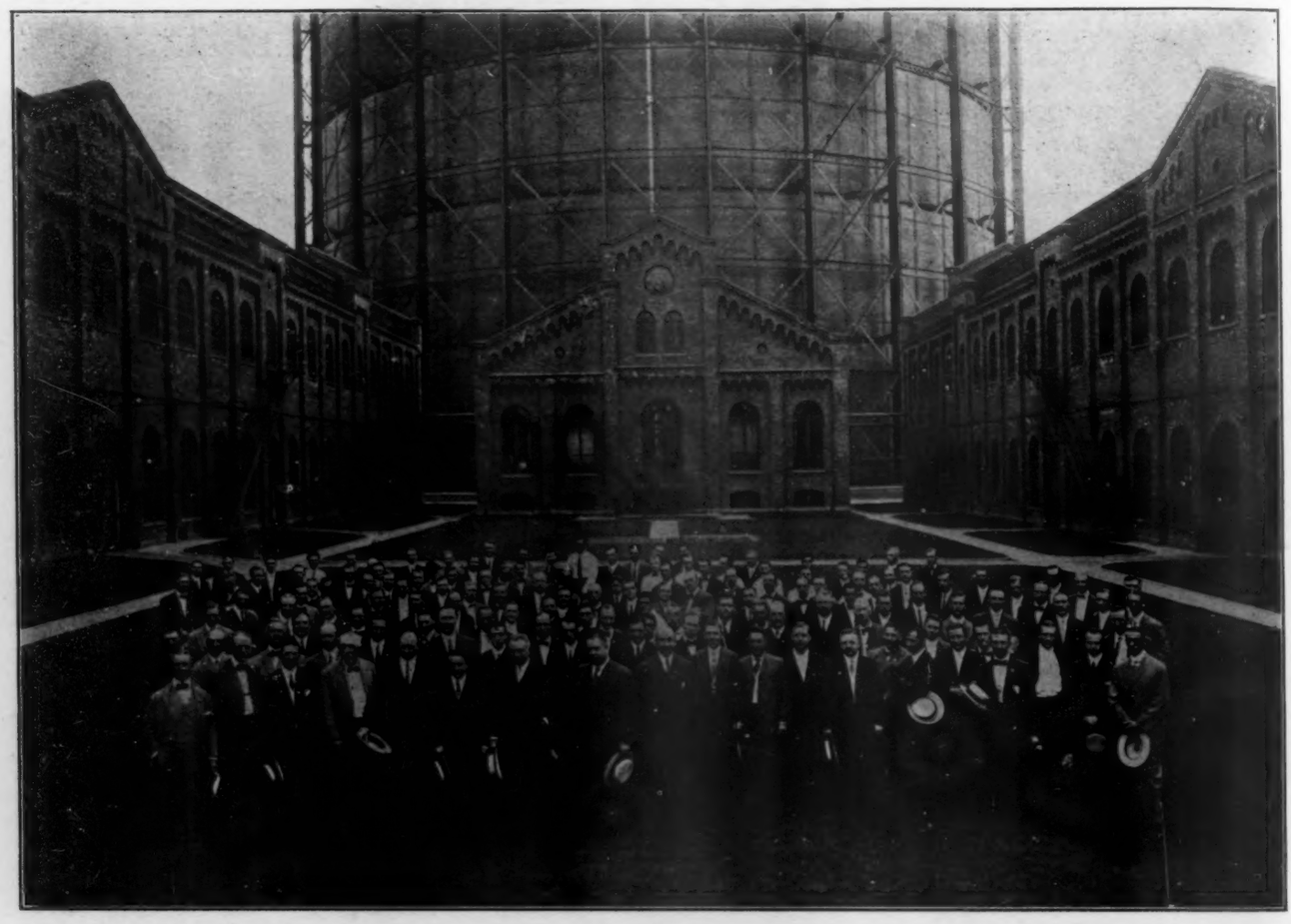


CURRENT MENTION.—

MR. GEORGE H. WARING, whose incumbency of the position of Superintendent of the Omaha (Neb.) Gas Company dates back to 1902, and whose administration of the duties of that rather difficult post were of the most admirable sort, has accepted the dual office of Vice-President and General Manager of the Charleston (S. C.) Consolidated Railway, Gas and Electric Company. He assumed his new duties the first inst. Mr. Waring's successor at Omaha is Mr. Joseph A. Perry, from the home (or Philadelphia) division of the United Gas Improvement Company.

THAT capable gas engineer and clever gentleman, Mr. William E. McKay, has been appointed General Manager of the New England Gas and Coke Company, with headquarters in the Shawmut Bank Building, Boston, Mass. May the best of good luck ever be with him.

IN a characteristic letter to us, dated Providence, R. I., July 2d, signed by Mr. A. B. Slater, Jr., the writer sends along so many newsy things that we cannot forbear repeating some of them. For instance: * * * Just received a letter from Mr. A. Naito, Constructing Engineer, Omri gas works, Tokyo, Japan, who was in this country at the time of the World's Fair, St. Louis. * * * He then toured the States. He is very much interested in high pressure service, and I would like you to send him a "bunch" of literature bearing on the subject. * * * Can you arrange it? Didn't appear to be much in the gas business for me, so I decided to raise foodstuff instead of buying it, so now, rather than being some other fellow's dog, I have no need for care about the high cost of living, for the farm yields me better grub than most of 'em get, and I don't have to worry over looking well when entering some fellow's office. "Yours, to a finish."

MR. CORBET WOODALL, formerly an Assistant Engineer on the rolls of the United Gas Improvement Company, has been appointed General Manager of the Brooklyn Borough Gas Company, with headquarters in Coney Island, New York. He succeeded Mr. James J. Humphreys, whose taking charge at Louisville, Ky., some weeks ago, was duly announced by us. Mr. Woodall, who is of the family of that name that has gone on to take high rank in English gas engineering circles—Corbet Woodall, for instance, is an example—comes to his task well accredited and thoroughly equipped for his duties at the famous American seashore resort, and to close the reference, we here reproduce some lines from the letter to hand announcing his promotion: * * * "Mr. Woodall has made many friends throughout the country, and he is a thoroughly capable gas engineer. He combines engineering ability with commercial sense, and I am sure he will gain splendid success in his new position."

"MANAGER ESTBERG, of the Greeley (Col.) Gas and Electric Company, recently found it necessary to enter into a further contract with the Gas Bench Construction Company, at St. Louis, for additional capacity in his retort house." So writes a correspondent in St. Louis, under date of the 5th inst.

[No. III.]

Review of the Twenty-fifth Annual Report, Massachusetts Board of Gas and Electric Light Commissioners.

[Prepared for the JOURNAL, by MR. H. THURSTON OWENS.]

Inspection of Gas and Gas Meters.—The companies subject to inspection numbered 68, being the same as in the previous year. The number of inspections, however, decreased, from 1,018 to 929. A number of changes were made by the Legislature, and went into effect July 1, 1909, by far the most important of which gave the Board the authority to change the quantity of sulphur permissible from 20 to 30 grains per 100 cubic feet, which they did under date of August 5, 1909.

Sulphur.—For purposes of comparison the test for sulphur are divided so as to show the averages for the first 6 months under the old law and for the last 6 under the new one.

There were 36 companies, having 5 or more inspections during the year, and in 23 cases the average was lower during the last 6 months. For the 26 companies having less than 5 inspections, there were no tests in 10, and in 5 of the remaining 16 the averages for the last 6 months were lower than for the first six. Companies showing an excess of sulphur during the first 6 months numbered 39, and during the last 6 months there were only two.

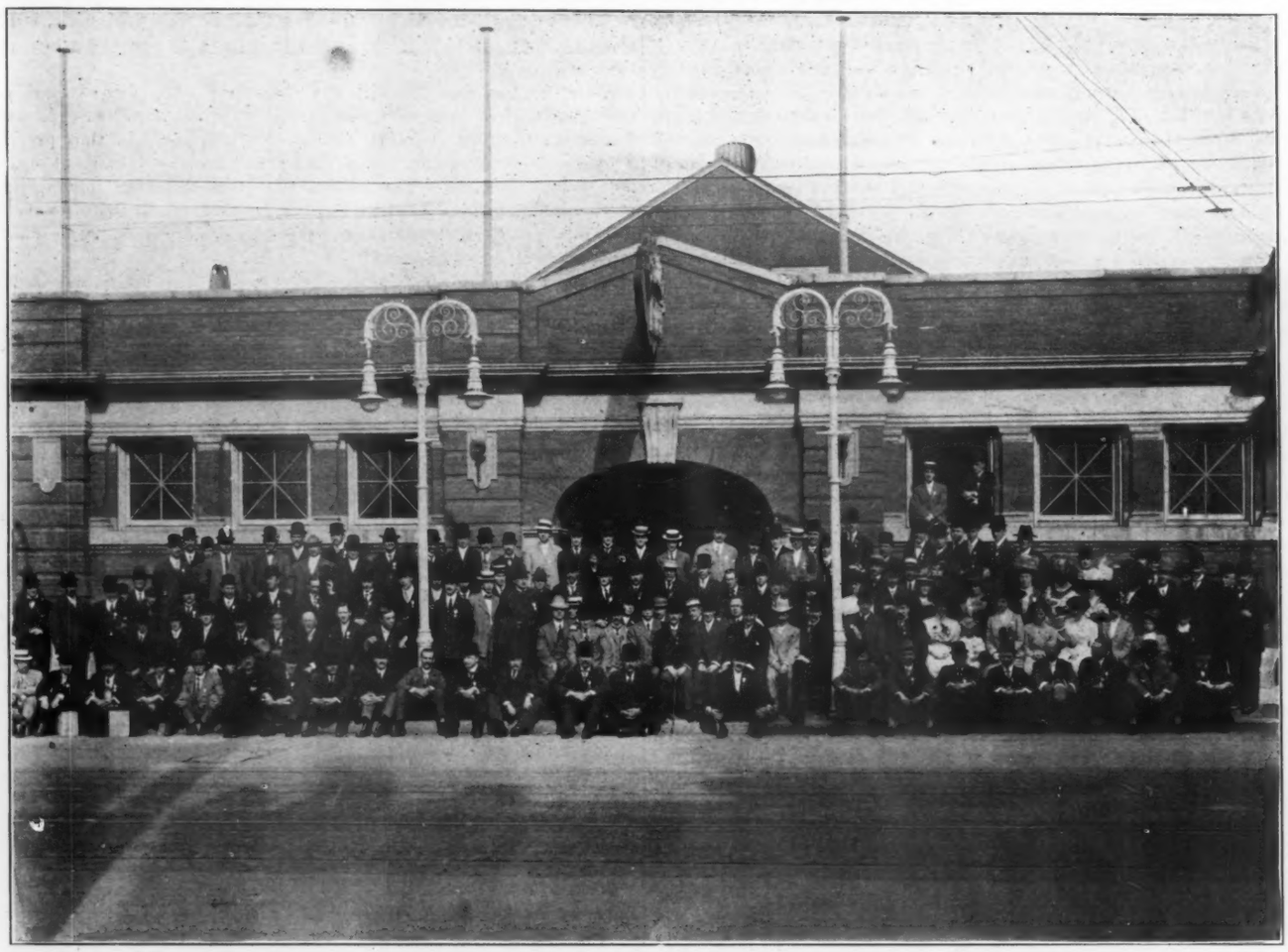
Ammonia—Six companies showed an excess of ammonia in seven cases, which is about the same return as in former years, the maximum being 16.3.

Sulphuretted Hydrogen.—Fifteen companies showed sulphuretted hydrogen in 24 cases.

Candle Power.—Deficient candle power (less than 16) was found in 15 companies, in 24 cases. Excluding the oil gas and acetylene gas companies, the highest, lowest and average candle power tests showed as follows: 26.9; 12.8; 18.3. The average candle powers in the three kinds of gas for the past 3 years were as follows:

	1907.	1908.	1909.
Coal gas, 22 companies. ...	17.01	16.92	17.11
Water gas, 12 companies	20.61	20.30	20.66
Mixed gas, 28 companies.....	18.23	17.67	18.23

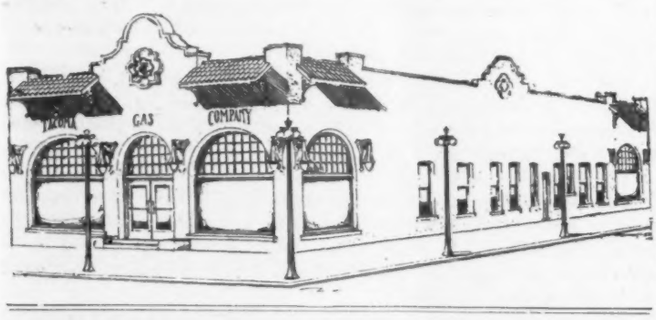
In the oil gas companies the candle power averaged from 19.8 to 46.8, the average being 29.33.



Third Annual Convention, Canadian Gas Association, Hamilton, Ont., June, 1910. Steps leading to Alexandra Rink.

Sketch of New Offices of the Tacoma (Wash.) Gas Company (Mr. Luther Turchell, Architect).

Now in course of construction at Tenth and A streets, Tacoma. Dimension, front, 40 feet on Tenth; depth, 115 feet on A street. Type of architecture, ancient Spanish Mission; materials, iron, brick and adobe, colored plaster. Following the general type, the roof will be of red tileing, quaint gables lending a suspicion of the old Castile. The exterior of the structure will be lighted by powerful arc gas lamps, and on the sidewalk edge will be suspended clusters of gas globes covering inverted mantle lights. The entire



finishing is in quarter-grained oak. The showrooms occupy the front of the building and here are displayed two complete lines of apparatuses for the use of gas in heating, lighting and cooking. There is a comfortable little corner for the accommodation of patrons calling on business, and the broad, inclosed space, in the center of the building, is occupied by the general office staff. Promoting the general utility of labor-saving devices itself, the Tacoma Gas Company officials have not been at all tardy in availing themselves of such devices in their office. Here are seen the automatic addressing, auditing, counting and other time-saving and accurately gauged office devices. It is the record of the office that no error can be made without tracing its source.

[Prepared for the JOURNAL.]

Gas Franchises and Privileges: Their Legal Characteristics and Constructions which the Courts have Placed Upon Them.—No. II.

[By MR. JOHN EDSON BRADY, Attorney-at-Law.]

Mandamus to Compel Gas Company to Furnish Gas.—A dispute having arisen between the defendant gas company and the plaintiff, one of its customers, as to the amount due to the company from the plaintiff, the company removed the plaintiff's meter and shut off the supply of gas. An action on the account resulted in a verdict in favor of the customer. Thereupon the customer requested the company to again furnish him with gas, which it refused to do, except upon receiving a deposit of $10 to insure against future gas bills. This the customer refused to do, and he brought this action against the company to compel it to supply him with gas in spite of his refusal to make the required deposit. The company pleaded that it had been customary to require applicants for gas, who were unknown to the company, or who were known to be financially irresponsible, to leave a deposit with the company before it would turn on the gas. On cross-examination the manager of the company admitted that, in demanding the deposit in this particular instance, he was actuated by feelings of spite which he entertained toward the plaintiff.

It was held that, while the company was entitled to establish a rule requiring deposits in certain cases, it had not resorted to the rule in good faith in this instance, and a writ was issued commanding the company to supply the plaintiff with gas. In the opinion the court said: "The company is bound to furnish gas upon application, and it is but just that it be not compelled to supply unknown or

irresponsible persons therewith, without assurance in some form that it will receive compensation. The adoption of a formal rule exacting security seems unnecessary, if there is a well established custom, as appears in this case, to exact security as stated. The evidence discloses that this had always been customary with the company. In such a case, the custom has the force of a rule or regulation. Of course, it could not impose different terms according to whim or caprice, but must treat all consumers in like situations alike. The company may not base a rule on the theory that people as a whole are dishonest, but it has a right to adopt a rule which, while giving the honest citizen what he pays for, will prevent the dishonest from getting that which he will never pay for." But it was in "retaliation, rather than because of questioning the plaintiff's financial responsibility," that the company demanded the security. The court was, therefore, of the opinion that the writ of mandamus against the company should issue. Phelan *v.* Boone Gas Co., Supreme Court of Iowa; 125, Atl. Rep., 208.

Company Not Liable for Explosion of Gas Unless Negligence is Shown.—Gas companies cannot be made to respond in damages for every explosion of gas that occurs, as is shown by a recent decision of the Supreme Court of Kansas. The company which was sued was required, under an ordinance of the city of Topeka, to furnish and place meters in all buildings to be supplied with gas, free of charge. One of the tenants of a new building had requested that a gas meter be installed, and it appeared that shortly afterward two young men came around and, after obtaining the keys to the apartment, placed the meters in position. On the same day the plaintiff in this action entered the apartment and, just as he had gotten inside, an explosion occurred. He was unable to explain how it happened. While the young men who brought the meter wore no badges which would indicate that they were employees of the gas company, it was held that it might be reasonably inferred that they were in the employ of the company. But the court was unwilling to go further and infer that the gas jets, through which the gas which exploded had escaped, were left open through their negligence or through the negligence of other employees of the company. And there was no evidence tending directly to establish such negligence. "To hold the company," said the court, "the further presumption must be indulged that, after going into the apartment, they not only did something to the fixtures, but that they negligently left the gas turned on. * * * There is nothing in the testimony showing any duty on the part of the company to inspect the plumbing throughout the apartment, or to do anything with the fixtures when a meter is placed. Inspections had been made by those who put in the pipes and fixtures, and why should it be presumed that those who put in the meter should go over the entire system again, or do more than to test the connections where the meter was placed. Too many presumptions are necessary to connect the company with the explosion. The general rule is that a presumption must rest upon well-established facts and not upon mere process of reasoning or another presumption. Here there must be a presumption that the men entered the apartment, another that, after getting in, they manipulated the fixtures, and still another that, when they had finished, they left the jets open and negligently allowed the gas to escape. To recover, it devolved upon the plaintiff to show culpable negligence on the part of the company, and his testimony falls short of proving a *prima facie* case of negligence." Judgment was accordingly given in favor of the company. Heinz *v.* Consumers Light, Heat and Power Company; Supreme Court of Kansas; 105 Pac. Rep., 527.

The Careful Engineer and Fireman.

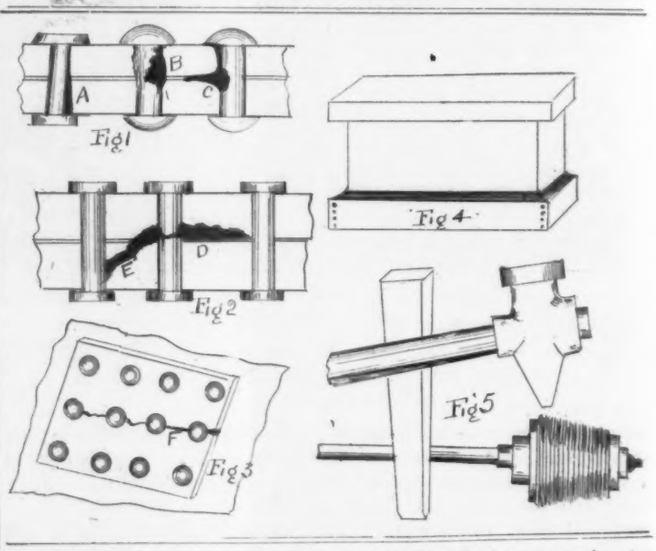
[Prepared for the JOURNAL, by "ENGINEER."]

There is a great difference in men employed in the engine and fireroom of the modern steam plant, as is well known. Some men who are exceedingly careless nevertheless manage to get along, through what seems to be purely good luck; then one knows of other men who, having been out late at night, come to work in the morning with a sleepy look, and fumble about their jobs. There are men who are in it for the money alone and who mark time, counting the days to payday. On the other hand there are men of the engineering fraternity who are quite alive and up-to-date; men who strive, not only for promotion, but for the improvement of the plant and working force under them. There are men who seek to so improve conditions that the speed will be better, and the power steadier, and there are engineers who study at home and during idle hours, so as to make themselves more proficient in their chosen profession, while other men prefer to read the cheap literature of the age whenever the chance offers itself.

After one has mingled with the "profess." a number of years, he soon gets to that point where he is able to select the blear-eyed payday drunk from the reliable men and cast him out, and that process of elimin tion is going on all the time in every important steam power establishment. The risk is too great to let an incompetent man remain, and the average engineer or fireman is fully aware of this, wherefore, he almost always seeks to avoid the bouncing which must come if he is negligent.

As a rule, we find that the working force of the boiler and engine room attend to business. If the workmen do not the bubble bursts soon, and a new force of men is engaged. Of course, one cannot expect perfection always; but the superintendent has a right to expect loyalty. He relies upon his assistants to crawl into the boilers when necessary to remove the scale, to chip out hard substances, to locate corroded places and make needed repairs.

He cannot always be there to see that the water is not blown out of a boiler under pressure, and he must rely upon men who are supposed to know that such an act is liable to strain the rivets due to sudden change of temperature. Yet I have seen grey-haired men do this act, not realizing what it meant, I have seen men let the blowpipe get full of scale and then then try to keep on with the cleaning process. Some men hesitate about getting inside of a boiler, even when the manhole is amply large to let an average-sized person pass. Of course, there is some excuse for the fat man who might get caught, but there are always a number of lean chaps about the plant who



may be pressed into service. There are stories of persons turning on the steam into boilers when the cleaners were inside, and in reality occasionally this does occur, the unlucky man getting a bad scalding before he can get out. Ordinarily, however, it is safe to go inside and make inspections, and now that we have handy, transportable electric hand lights, many defects can be discovered which one could not locate with a lantern, candle or torch.

The exterior of the boiler plate may seem to be perfect, but careful examination of the interior with a powerful electric light may reveal a corroded place alongside a rivet, as at *A*, Fig. 1; or the corrosive action may be internal, as at *B*; or it may extend along the juncture of the plate line, as at *C*. You cannot find these imperfections on the shell outside. You must enter the manhole and look. You may not have to look long to find a place where the metal has been eaten away, as at *E* and *D*, Fig. 2. Part of the middle bolt was found to be affected in this case. In order to fix it, the places had to be opened and new ones put in.

Then you may discover an interior patch, of the character shown in Fig. 3, at *f*. If the patch is outside the boiler you may see it before; but, if inside, the only way is to depend upon an interior investigation. I find that the men who are really interested in their work do not hesitate to enter their boilers as often as need be for an examination of the same. On the other hand, some men go so far as to tell untruths about the matter. An owner of a steam plant told me the other day that the engineer had made report, in writing, of certain bi-monthly inspections of interiors of boilers, when really no such in-

spections had taken place. That man was, of course, discharged. In establishments in which a good boiler washer is employed they are not liable to have much trouble in this way. The man will devote his time and energies to this special line of work.

In conversing with a professional boiler washer the other day, I was surprised to learn that he was quite well educated in his profession. He had a number of boilers of a gas works to clean and he did his work well. He showed me books on boilers and care of boilers which he read He had made a study of scales. He knew the fundamental principles of corrosive matter. He possessed a perfect outfit of devices for boiler and tube washing and carried his chest wherever employed. Fig. 4 shows the design of his box. This box is partitioned inside and in it he had everything needed for boiler inspecting, cleaning, repairing, etc. Fig. 5 shows a cluster of his tools.

He has fusible plugs, carries examining lenses to detect pittings in boiler plate, and owns mud removing devices and tools for all necessary work in connection with boiler washing. He, best of all, understands his responsibility. His flue scraper was of his own make and just the thing for the work intended of it. It certainly pays to have a good man at this end of the line in boiler plants.

Municipal Electric Light and Power Stations.

According to the advance sheets, Department of Commerce and Labor, Bureau of the Census, for 1907, municipal central electric light and power plants, or stations, increased over 100 per cent. more rapidly in number than the commercial stations in the United States.

A comparison of the number of reports received by the Bureau from municipal stations in 1907, with those received from the same source in 1902, shows an increase of 53.6 per cent. as against 23.4 per cent. for the commercial companies.

The proportionately greater increase in municipal stations, the report states, is largely due to the fact they are practically exempt from the consolidations that so frequently occur among the commercial companies.

A further analysis of the reports show that, although 33 municipal stations which reported in 1902 had become commercial stations in 1907, there were 113 stations reported as commercial stations in 1902 which had become municipal in 1907.

These facts do not furnish corroborative evidence of the claim which has been made, sustained by what appears reasonable argument, that the drift of these public utilities is from municipal to commercial use. On the contrary, the report states, there appears to be a distinct field for municipal electric stations, not only because of a feeling which may exist in many localities that these public utilities should be owned by the cities, but because many of the places in which municipal plants are located do not present sufficient inducement for the investment of commercial capital.

The Number of Stations.—The total number of commercial and municipal stations in 1907 was 4,714, as compared with 3,620 in 1902, an increase of 30.2 per cent. Of these, in 1907 there were 3,462 commercial stations, while in 1902 there were 2,805; an increase amounting to 23.4 per cent. In 1907 the municipal stations numbered 1,252, as against 815 in 1902; the per cent. of increase being 53.6.

Comparing the details for municipal stations in 1907 with similar items in 1902, it appears that the cost of construction and equipment in 1907 was reported as $42,879,447, while in 1902 it was $22,020,473; an increase of 94.7 per cent. The gross income of the municipal stations in 1907 was $14,011,999, as compared with $6,965,105 in 1902; an increase of 101.2 per cent. Both sums include the estimated income for current consumed in municipal buildings and in lighting streets, parks, etc. The gross income in 1907 includes $13,614,434 for electric service, as compared with $6,836,856 in 1902; an increase of 99.1 per cent. Of the amount received for electric service in 1907, there is charged to lighting $13,040,263, while in 1902 the amount was $6,748,863; a gain of 93.2 per cent. The revenue from stationary motors, as a part of the electric service in 1907, was $516,373, and in 1902 it was $70,540; an increase of 632 per cent. All other income from electric service in 1907 amounted to $57,798, as compared with $17,453 in 1902; the per cent. of increase being 231.2. All other general sources of income in 1907 yielded $397,565, and in 1902 the amount was $128,249; an increase of 210 per cent.

The immense percentages of increase in income from electric service for stationary motors is conspicuous. The increase in this respect shown for the commercial stations in 1907 was but 184.5 per cent. The municipal stations in 1907 showed a 93.2 per cent. increase in the income from lighting, while the commercial plants gained 77.8 per cent.

The per cent. of increase in total expenses in 1907 was slightly larger for the municipal plants than for the commercial, the former showing 93.4 per cent. and the latter 91.3 per cent. The municipal stations' total expenses in 1907 amounted to $9,167,188, as compared with $4,741,182 in 1902.

The cost of fuel for the municipal stations in 1907, which was $3,232,783, increased 123.6 per cent. over $1,445,824 in 1902. The commercial stations in 1907 expended $19,824,962 for fuel, as against $10,189,685 in 1902, an increase of 94.6 per cent.

Salaries and Wages.—There was in 1907 an increase of 85.4 per cent. in the amount—$3,485,015—paid by municipal stations for salaries and wages, while in 1902 the figures were $1,879,722. In this respect in 1907 the commercial stations increased 70.2 per cent.

In 1907 there were 1,615 salaried officials, clerks, etc., who earned $994,832, in the employ of the municipal stations, as compared with 950, who earned $157,381, in 1902, an increase of 117.5 per cent. in salaries and 70 per cent. in employees. The per cent. of increase for the commercial stations in 1907 was, in salaries, 106.3, and in employees, 88.1.

The average number of municipal wage earners in 1907 was 3,951, earning $2,490,183, as compared with 2,467, earning $1,422,341, in 1902, an increase of 60.2 per cent. in the number of wage earners and of 75.1 per cent. in wages. For the commercial stations in 1907 there was an increase of 47.1 per cent. in the wage earners and of 56.3 per cent. in wages.

The number of primary power machines in the municipal plants in 1907 was 1,945 and in 1902 it was 1,160, an increase of 67.7 per cent. In this respect the commercial stations in 1907 increased 29.7 per cent. There was in 1907 an increase of 100.9 per cent. in the horse power capacity, 319,847, of the primary power machines in municipal plants, as compared with 159,193 horse power in 1902. The per cent. of increase for the commercial plants in 1907 was 122.1.

There was a 61.7 per cent. increase in the number, 1,714, of steam engines and turbines in the municipal plants in 1907, as compared with 1,060 in 1902. The per cent. of increase for the commercial stations in 1907 was 12.8. The horse power of these municipal engines in 1907 was 283,418, as against 147,018 in 1902, an increase of 92.8 per cent. The per cent. of increase for the commercial stations in 1907 was 90.1.

Power Equipment Statistics.—An increase in 1907, amounting to 333.3 per cent., was noted in the number, 78, of gas engines in the municipal stations, as compared with 18 in 1902. The commercial stations' per cent. of increase in 1907 was 161.9. The horse power of these municipal engines in 1907 was 6,082, an increase of 535.5 per cent. over 957 in 1902. The commercial stations gained 343.2 per cent. in 1907.

There were in 1907 in the municipal plants 153 water wheels, with 30,347-horse power, as against 82, with 11 218-horse power, in 1902, an increase of 86.6 per cent. in the number and of 170.5 per cent. in the horse power, The commercial stations in 1907 increased 78 per cent. in the number and 208.7 per cent. in the horse power of such wheels.

In 1907 the municipal stations were equipped with 2,395 dynamos, with 209,016-kilowatt capacity, as compared with 1,822, of 113,380-kilowatt capacity, in 1902; the per cent. of increase in the number being 31.4 and in the capacity 84.3. The commercial stations in 1907 decreased 8.3 per cent. in the number of dynamos, but showed a 127.5 per cent. increase in capacity.

The output, in kilowatt hours, of the municipal stations in 1907 was 289,462,788, as compared with 195,904,439 in 1902, an increase of 47.8 per cent. The commercial stations in this respect in 1907 increased 141.1 per cent.

There was in 1907 an increase of 63.3 per cent. in the number of arc lamps and of 156.9 per cent. in incandescents wired for service by the municipal stations. The commercial stations showed in 1907 an increase of 41.2 per cent. in arcs and of 125 per cent in incandescents.

In the report the commercial and municipal stations are combined and further classed as "purely electric," or those that do a strictly electrical business, and as "composite," or those operated in connection with some other industry.

The "Purely Electric" Stations.—Of the 1,252 municipal central stations in 1907 there were 521 "purely electric" and 731 "composite." Nearly two-thirds of the 3,462 commercial stations were reported as "purely electric" and the remainder "composite." While the proportions for the chief items for the commercial stations are

decidedly greater in the "purely electric" class, this does not hold true for the municipal stations, where such important totals as income, expenses, horse power of primary power plant, kilowatt capacity of dynamos and number of incandescent lamps are greater for the "composite" stations. The fact that such public utilities as water and gas are so often operated by municipalities which also operate electric stations largely explains this condition. Exclusive of the item of arc lamps, about 6 per cent. of the income of the "purely electric" group was reported by the municipal stations, as compared with about 10 per cent. for these stations in the "composite" group.

The stability of the municipal plants is exemplified by the fact that 774 of the 815 plants reported in 1902 also reported in 1907. Of the 41 which failed to report in 1907, 33 had become commercial stations, 4 had discontinued operations or were idle, 2 were connected with public institutions, the plants of which were excluded from the census of 1907, 1 was merged with another municipal plant because of the consolidation of two cities since 1902, and 1 was destroyed by fire and had not been rebuilt at the time of taking the census of 1907.

The total number, 1,252, of municipal plants in 1907, was distributed, 150 in the North Atlantic States; 158 in the South Atlantic; 727 North Central; 166 South Central, and 51 Western.

Most of the municipal stations are in places of small population, nearly ⅔ of the total number being located in places of less than 5,000 population, and less than 3 per cent. in places having a population of 25,000 and over. In the 3 divisions—the South Atlantic, the South Central and the Western—together only 1 station was reported in 1907 for cities of over 100,000 population, but it is to be remembered that in these 3 divisions together there were only 8 cities of this class according to the census of 1900. In the North Atlantic division there were 16 cities of this class, with only 2 municipal plants in 1907, and in the North Central 14 cities, with 9 municipal plants. The 1 station reported for the South Atlantic division was in Baltimore, while the 4 stations in the "500,000-and over population" class of cities in 1907 and 1902 in the North Central division were all located in Chicago.

Rules and Regulations Governing Inspection of Gas, New York Public Service Commission, Second District.

The official book of rules and regulations, carrying instructions to inspectors, thus provides:

ARTICLE I.—INSTRUCTIONS TO INSPECTORS.—SECTION 1.—TESTS FOR CANDLE POWER. A. GENERAL DIRECTIONS:

(1) *Before Tests.*—Remove the plug from the dry well of the meter and open the valve above the water glass.

See that there is no water in the dry well, and that the water in the glass moves freely; with inlet and outlet open to the air set the water line exactly correct.

Replace the plug, close the valve above the water glass and test the meter for a leak; then light the gas.

Allow the gas to burn long enough to be certain that the supply is fresh from the main.

Rate the meter for 5 feet per hour, corrections included.

Light the candles and allow them to burn 15 minutes, or until they have assumed their normal rate before beginning test.

See that both gas and candles are in perfect alignment with the plumb bobs.

Set the weight on the balance so that the candle end is a little heavier than the other, and start the stop watch as the pointer passes the center of the scale.

Place the 20-grain weight in the pan and read the meter when 30 seconds have elapsed.

The photometer room must be well ventilated and free from drafts. The temperature of the room should be between 60° and 70° F.

After the room has been thoroughly ventilated and doors closed, sufficient time must be allowed for all drafts to subside before commencing the test.

The inspector should never look at any bright object before making a reading, and all external light must be excluded from the bar. It is advisable, even with a closed bar photometer, to make the room as dark as possible before commencing the reading.

(2) *During Tests.*—Make as many readings as convenient (at least 15) reversing the disk for the last half of them and read the meter at the end of 4 minutes and 30 seconds.

Stop the watch when the pointer of the balance again passes the center of the scale and note the temperature of the gas in the meter, and the reading of the barometer.

The sight box must not be moved so rapidly as to cause flickering of the candles.

(3) *When Retest Necessary.*—If the 2 candles consume 20 grains in less than 4 minutes and 45 seconds, or more than 5 minutes and 15 seconds, another test should be made.

An exception to this rule may be made in the case of very hot or damp weather, when a variation of 30 seconds from the standard time may be allowed, if the inspector is satisfied that the test is in every way reliable.

If the rate of the gas varies greatly from the 5-foot rate, or if with a 2-candle balance the readings vary by more than $\frac{5}{10}$ of a candle, another test should be made.

D. Candles.—Use the standard English sperm candle weighing 6 to the pound; cut these in the center and burn from the middle towards the ends.

Always use the two parts of the same candle in making a test.

In lighting the candles place a drop of sperm in each cup at the base of the wick immediately after applying the lighted match.

In extinguishing, let fall a drop of sperm on the glowing end and then blow out the flame. The wick is the most delicate part of the candle and should never be touched after having once been lighted.

When the candles are burning properly the wicks will curve at right angles and the ends glow with a clear, red heat. The plane of curvature of one wick should be at right angles to that of the other, and one glowing end should face the disk.

The cup of the candle should be fairly dry, regular and occupy the full diameter of the candle.

C. Burners: (1) *Second Class Cities.*—In cities of the second class, namely, Albany, Schenectady, Syracuse, Troy, Utica and Yonkers, use, as required by Chapter 557 of the Laws of 1907:

A No. 7, slit Union Bray burner in testing the candle power of water gas or mixed coal and water gas containing 50 per cent. and less of coal gas.

A new F Argand burner for coal gas or for mixed coal and water gas containing over 50 per cent. of coal gas.

(2) *Other Municipalities.*—In all other cities and towns use the burner that will give the best results. This generally will be:

A No. 7, slit-Union Bray burner for gas of over 21-candle power.

The new F and the Bray burner for gas of between 19 and 21-candle power.

The new F, if the candle power of the engine is between 17 and 19.

The new F and the old D Argand burner, if the candle power of the gas is between 16 and 17.

The old D for gas below 16-candle power.

If the height of the gas flame is over ⅔ that of the chimney, or if it is less than 1½ or 2 inches, the indications are that a different burner should be used.

D. Corrections.—Corrections should be made as follows with respect to

(1) *Candles.*—For every 3 seconds under 5 minutes add 1 per cent.; for every 3 seconds over 5 minutes subtract 1 per cent.

(2) *Temperature.*—With a wet meter, add 1 per cent. for every 4° over 60°; subtract 1 per cent. for every 4° under 60°.

With a dry meter add 1 per cent. for every 5° over 60°, and subtract 1 per cent. for every 5° under 60°.

(3) *Barometer.*—For every $\frac{3}{10}$ of an inch over 30 inches subtract 1 per cent.; for every $\frac{3}{10}$ of an inch under 30 inches add 1 per cent.

(4) *Gas.*—Calculate the percentage variation during the test from the normal rate of 5 feet per hour. Add the correction if the gas is burning less than 5 feet per hour. Subtract the correction if burning over 5 feet per hour.

E. Place of Test.—In the cities of the second class the place of test, as provided by Chapter 557 of the Laws of 1907, shall be at a distance or not less than 1 mile, nor more than 1½ miles, from any distributing holder.

This requirement should be followed whenever possible in all other municipalities. Where, however, it is impracticable in municipalities other than cities of the first and second class to observe this distance, the place of test shall be the farthest available point from the works where the gas is made.

SECTION 2.—TESTS FOR IMPURITIES.

A. Sulphur.—The rate of burning must not exceed $\frac{7}{10}$ of a foot per hour, and whenever possible should be $\frac{5}{10}$ of a foot per hour.

Ammonia should be added to the cup around the burner after every $\frac{5}{10}$ of a foot of gas that passes.

Burn $\frac{5}{10}$ of a foot, corrected for temperature, pressure and error of the meter.

Care must be taken to see that the column hangs vertically during the test; that air is plentifully admitted at the base, and that the odor at the top of the bead glass is slightly ammoniacal.

Wash out the apparatus with distilled water and forward the sample to the laboratory.

B. Ammonia.—The bulb should always be rinsed before using and the pipette washed out with a little of the standard acid.

One foot of gas corrected is to be burned for this test, provided the end point does not appear before this amount is consumed.

If ammonia be present the meter reading is to be taken at the instant when the change in color of the cochineal shows that the entire amount of the acid is just neutralized. At the end of the test the contents of the bulb are to be turned into the bead glass.

C. Sulphuretted Hydrogen.—The gas should flow at a rate approximating 5 feet per hour, and care must be taken to make the test only on gas fresh from the main.

Moisten a corner of the note book with the lead acetate solution and expose the spot to a current of the gas for 30 seconds, provided a blackening of the moistened spot does not appear prior to the expiration of that time.

An entry should be made in the note book of the time required to produce discoloration, if any, of the lead acetate.

SECTION 3.—ANALYSES, HEAT UNITS AND SPECIFIC GRAVITY.

Analyses of all sulphur samples will be made in the laboratory at Albany by a volumetric method, using barium chromate and stannous chloride.

Analyses of gas for special purposes will likewise be made in the laboratory, using Hinman's apparatus.

Heat units will be determined by the Junkers calorimeter.

Specific gravity will be determined by comparing the time which it takes for a given volume of air and of gas to escape through a small orifice.

SECTION 4.—RECORDS AND REQUISITIONS.

Enter results of tests in the record books provided by the Commission.

Make all entries in ink.

Make all entries direct from the test and not on separate papers and copied.

Explain, in the place reserved for remarks, any omission to give the information required in the record book.

If for any reason parts of the same test are made in different localities, report each place of test, and the test made at each place.

Send record book to the Commission at the end of each week to be checked up, and until its return use alternate book.

Make all requisitions for supplies upon requisition forms and acknowledge the receipt of the supplies.

SECTION 5.—REPORTS.

A. To the Commission.—The inspections of each day and the results shall be reported same day to the Commission on Form No. 17.

Accompanying each such report will be a carbon copy of the inspector's report to the company, as provided in Section 5, subdivision B below.

Where several tests are made the best results obtained from any satisfactory test shall be accepted and reported as the official result.

Report the kind of gas tested in each case where the company has both a coal and water gas plant.

B. To Companies.—Upon the same day that the test is made the inspector shall report in writing to the company by mailing or personal delivery to a representative of the company, the results of the test as to candle power, ammonia and sulphuretted hydrogen.

These results shall be reported on Form No. 138, and in no other manner, and the inspector shall thereon state whether the candle power is "up to standard" or "below standard," the ammonia "excessive" or "non-excessive," and whether hydrogen sulphide is "present" or "absent."

SECTION 6.—USE AND CARE OF APPARATUS.

A. Photometers: (1) *Portable Photometers.*—Care should be exercised to set these instruments up rigidly.

The disk box should be so moved as to avoid vibration of the flame.

The standard flexible metallic tubing furnished by the Commission shall be used, and no other, in making connection.

All parts of the instrument and appliances used with it must be kept clean.

Gatherings of dust should be scrupulously removed before using the photometer, and particular care in this respect should be given to the disk box, chimney and interior of the bar.

(2) *Stationary Photometer.*—Examine each stationary photometer provided by a company before use.

Report to the Commission evidence of improper care by a company of its photometer.

See that the photometer is level; that the sight box slides freely; that all weights are clean and dry; that the balance swings freely; that the alignment of burner and candles is correct; and that the height of both burner and candles is such that the flames shall be opposite the center of the disk.

If the photometer be of the open bar type, see that screens are properly placed, so that reflections are excluded from the sight box, and that the flames of candles and gas are cut off from the eye of the observer while making readings.

See that the meter is level and that there is no strain on the connections and no leak. Notice carefully the size of the divisions in the outer circle. If a pressure regulator is employed, test to see that it is working properly, and so adjusted that the pressure at the burner shall be about 1 inch.

The burner should be examined to see that the steatite or lava is not cracked or chipped, and that there is no leak around the base. In the case of the Argand burner the chimney should be 7 inches high by 1¾ inches in diameter, and should so rest on the burner as to be vertical.

B. Sulphur Boxes.—Test *sulphur meter* weekly and record results in inspector's note book.

Clean the valves once a month with a soft rag or piece of chamois.

Do not use the meter if it is found to be more than 5 per cent. in error. In case this error can be rectified by simple adjustment, the inspector shall make such adjustment.

Compare *barometer* once a week with some standard instrument and cause to register correctly.

Keep *reagent bottles* clean.

Never open the acid bottle when the fumes of ammonia are near.

Watch carefully the action of the acid, and in case there is reason to suspect deterioration, send a carefully prepared bottle full to the laboratory for test.

Thoroughly wash out the entire *sulphur column* at least once a month, and oftener if convenient.

Keep adapters, connecting piece, and Erlenmeyer clean.

The pipette should drain perfectly, and to insure this, frequently clean out with a solution of potassium bichromate and sulphuric acid.

Carefully pack adapters with rubber between them, and do not press together too tightly.

C. Specific Gravity Instrument.—Keep the platinum tip and glass cylinder clean.

Keep the joints well greased and the rubber tubing supple.

D. Calorimeter.—Keep the nickle work well polished and frequently clean the inside of the body where the condensation collects.

Keep the burner free from dust.

Keep the condensation graduate clean and dry.

Carefully dust the lenses and thermometer.

Pack the whole apparatus with the utmost care.

ARTICLE II.—INSTRUCTIONS TO COMPANIES.—SECTION 1. APPARATUS.

By reason of the costliness, size and requirements surrounding installation of standard stationary photometers, their purchase by companies producing less than 15 million cubic feet of gas annually has not been insisted upon. It is important, however, that all companies should maintain upon their premises photometric apparatus, approved by the Commission, of such reliability that the candle power of the gas manufactured may at all times be determined by them with reasonable certainty. The jet photometer is not approved by the Commission.

The photometer should be set level in a well ventilated room where the temperature is maintained as far as possible between 50° and 70° F. In second-class cities this room should be situated at least 1 mile, and not more than 1½ miles from the works where the gas is made.

Curtains should be provided for the windows, and, if possible, a blow-off, in order that the dead gas lying in the service pipe may be speedily exhausted.

The bar of the photometer should be measured with great care and the meter tested.

Every photometer used for coal gas should be provided with the

old style D and the new style F Argand burners, and every photometer used with mixed gas or water gas should have in addition a No. 7 slit Union Bray burner.

The interior of the bar of the photometer should be kept free from dust, and no object should be placed therein.

In the case of the open bar photometer screens should be provided at proper places on the bar, in order that reflections may be excluded from the sight box, and that the candle and gas flames may not interfere with the observer when making readings.

The meter must be set level and in such a position that water may be removed or added wtthout serious inconvenience.

The heights of the gas pillar and balance should be so adjusted that the gas and candle flames are opposite the centers of their respective openings in the bar, and are not cut off by the shields surrounding these openings.

The bearings of the candle balance should be cleaned before every test and the weights examined to see that no sperm or dirt has collected upon them.

Any damage to the stationary photometer or apparatus connected therewith which renders the same unfit for use, should be reported in writing at once to the Commission, with a statement as to when the photometer will again be ready for use.

The location of the stationary photometer should not be changed without prior notice to the Commission.

SECTION 2.—RESULTS OF TESTS.

For the assistance of the companies in remedying deficiencies in the qualities of gas, the inspectors of the Commission will report in writing the results of tests to the companies immediately upon their completion. The results reported will be as to candle power, ammonia and the presence of sulphuretted hydrogen.

Results as to the quantity of sulphur will be contained in the official report of the test, which will be mailed the companies from Albany. This report will correct, if necessary, any mistakes in the inspector's routine report to the companies.

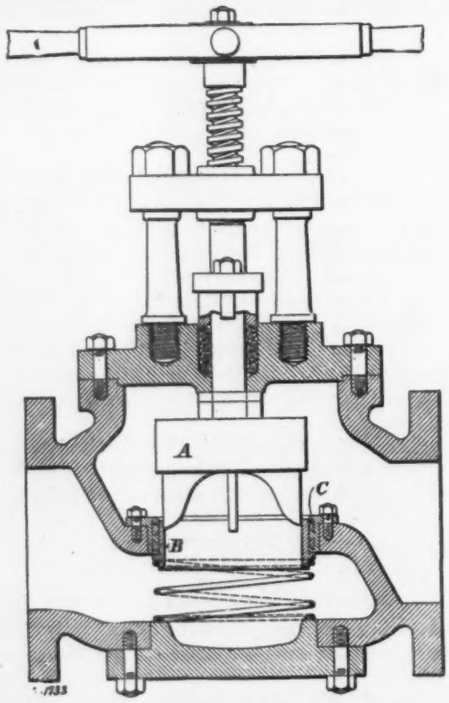
On the receipt of the official notice the company shall explain reported deficiencies, if any, and whatever remedy has been applied.

A 6-Inch Steam Valve.

Engineering for June 24th illustrates a steam valve brought out by the Dover Engineering Works, Limited, Dour Iron Foundry, Dover, England, with the object of meeting the requirements of high-pressure and superheated steam, though it may equally well be used for other purposes. It is well known that the high pressures and temperatures now commonly adopted have a very detrimental effect upon the valve faces, especially when the quantity of steam required is small and the passage allowed for it is restricted. The faces become scored and, once this action commences, the defects become rapidly intensified. For this reason there have been many attempts to secure a longer serviceable life by the use of special alloys, or by special designs in which provision is made for the renewal of small parts.

In the D. E. W. valve, which is made in several sizes, a radical change of design has been made. The valve is of the plug type, with a cylindrical body, and the joint is made with metallic packing. In the illustration the valve is shown open. The plug *A* is free on the valve stem and, therefore, does not rotate when the latter is screwed up or down for the purpose of opening or closing the valve. The plug is fitted with wings on its underside, which serve to guide it in its downward movement. These wings or guides work up or down in a liner or shield *B*, which is an easy fit in the gland *C*. When the valve is open, as shown, this liner *B* altogther protects the packing from the action of the rush of steam. When the valve is being closed the plug *A* descends and finally comes in contact with the upper end of the liner, which is then gradually forced down until the spring is compressed and the plug has passed well into the gland *C*. On opening the valve the spring below the liner compels the shield to follow up the plug, until the shoulder on *B* comes in contact with the under side of the gland *C*. When it is only required that the valve should be partly open, the steam passes through the opening formed between the under side of the plug and the upper end of the shield. It is not essential that these surfaces be maintained in steam tight condition, and the erosion of either by the action of the steam is, therefore, quite immaterial.

The steam-tightness of the valve is maintained purely by the fit of



the plug in the metallic-packed gland *B*, and these surfaces are quite removed from the detrimental scoring due to the steam. Great care has been taken in producing a suitable metallic packing; that employed has a high fusing-point, and a coefficient of expansion equal to that of the bronze of which the valve is made. Valves of this type have been tested to over 1,000 pounds per square inch hydraulic pressure, and found absolutely tight. If the characteristics of metallic packing used for piston-rods, etc., may be taken as a guide, the wearing qualities of this valve should certainly be good. This is actually found to be the case in service, one valve, for instance, having been in use on a mechanical stoker engine for over six months without showing any signs of leakage. In order to test the wearing qualities of the plug and packing a valve has been submitted to a test in a machine by means of which it was opened and shut 10,000 times. After this it was tested by hydraulic pressure, and was found to remain quite tight at 800 pounds per square inch, the highest point to which that test was carried. The valves are made in all sizes up to 6-inch, the metallic packing in the smaller sizes being rolled into grooves cut in the body casting, instead of being fitted in a special gland as shown in the 6-inch size illustrated herewith.

Lights Far Out to Sea.

The "Illuminating Engineer" notes that, if certain enterprising electric sign men have their way the title of the sweet old sentimental ballad will take on a meaning expressive of the rank commercialism of the present age. Having possessed the earth, and even invaded the sky, the electric sign now seeks to make the ocean, or at least that portion of it bordering the summer resorts, resplendent with its glowing legends and bewildering effects of light. It has been proposed to erect large electric signs on barges, with the necessary equipment for generating current, and to either anchor these off shore or propel them slowly back and forth in front of the world famous boardwalk at Atlantic City.

At first thought it would seem that this could only be an additional contribution to the gaiety of nations for which this resort is famous. The local authorities, however, seem to take a different view of the matter, and have strenuously protested to the War Department against what they consider an encroachment upon their preserves.

The problem is certainly a novel one. The electric sign has presented quite as unique a problem to the government as did the accession of the Philippine Islands. From the technical point of view it is difficult to see what the War Department can do in the matter, except to treat it strictly as to its effect upon navigation. The right of the government to police all waters within 3 miles from shore is unquestioned, but whether this police supervision extends farther than

keeping the regular channels of navigation open may be seriously doubted. However this may be, it is certain that neither State nor municipal governments have any authority whatever beyond the shore mark of high tide. As in many other cases, where entirely new conditions arise, the matter will eventually have to be decided by public opinion.

A single float exhibiting an electric sign and anchored off shore, or propelled by licensed navigators, could hardly be called an obstruction or menace to navigation. The real question is, what would happen if other similar enterprises were inaugurated to an unlimited extent? Suppose, for example, that instead of one there was a whole marine parade of such barges passing back and forth in front of this or any other resort every night when the weather permitted. Would it be one of the spectacles which people would gather to see, or, by obstructing the view of the ocean itself, would it become an intolerable nuisance? There are probably a large number of people who would line up on each side of the argument.

The scheme is an original and daring one, and something ought to be always conceded to originality. The very high advertising value of the electric sign is further proven by the proposed plan. If the promoters of this scheme are balked by the government, why not try attaching an electric sign to an aeroplane?

Annual Report of Chief Inspector of Factories and Workshops, England.[1]

Flueless Gas Stoves.—In the 1909 report of the Chief Inspector of Factories and Worshops, just issued, there are a number of references to the use of flueless gas stoves. Mr. Rogers (Birmingham) reports that gas stoves are not often found in the factories there. They are commonly met with in workshops, and many notices have been served to provide hoods and outlet flues, which have been obtained in all cases, except a few which have been deferred through the pressure of other work. Mr. Sedgwick (Leicester) says that special attention has been given to this matter. These stoves are mostly found in places wherein wearing apparel is made up. The attention of occupiers has been called to the necessity of preventing fumes escaping into the workrooms, and much has been done, at his request, to make things satisfactory. Mr. Eatock (Nottingham) and others mention the use of various types of flueless gas stoves, the makers of which contend that they do not emit any noxious fumes, though in one place an occupier informed Mr. Lloyd Edwards (Wrexham) that he had suffered from headache since the introduction of the stove.

Mr. Walmsley (Leeds) finds that these stoves have been used in clothing factories, and attention has been drawn to the fact that they tend to interfere with the purity of the air and that proper ventilation is necessary. Mr. Owner (Hull) has also found them in use in workshops, and when the air has been tested an excessive amount of CO_2 has been shown. He says that as a rule the occupiers are willing to make necesssry alterations when defects are pointed out. Mr. Arbuckle (Sheffield) has not had much to complain of in the use of these stoves, but where found in small workrooms the risk likely to occur from the use of them has been pointed out to the occupiers. Mr. Younger (Halifax) had an air sample taken in a small workroom warmed by a flueless gas stove, and it showed 47.8 parts of CO_2 per 10,000. Another sample, after this stove had been replaced by another gas stove fitted with a flue, contained 18.2 parts only of CO_2; not in itself a good result, but an illustration of the extent to which the air was polluted by the flueless stove. Mr. Dunolly (Stockton) points out that a short, wide flue for all gas stoves is essential. Mr. Butler (Huddersfield) notes that it is very unusual to find any gas or oil stoves used without flues for carrying away the exhaust. Occasionally, in tailors' workrooms, a gas stove used for heating irons is found unventilated, and as such stoves are a factor in maintaining the temperature of the room, he has required ventilation either by inserting them in an open fireplace or providing special flues. Water radiators with a small gas jet are not used at all. Whatever use they may be in ordinary salerooms, offices, etc., he has found them quite inadequate for heating workrooms.

Mr. R. E. Graves (Northern Division) says that in spite of all that has been written and said by inspectors on the use of flueless gas stoves and radiators, they continue to be increasingly used for workrooms, both small and large. In large rooms, not very fully populated, and provided with sufficient natural outlets, the objections are not so great, but in small rooms, where windows and doors are the only means of ventilation, such contrivances cannot but be injurious, and the inspectors invariably require ample ventilation. Many air samples have been taken to test the conditions, and in almost every case a very high percentage of CO_2 has been found in conjunction with flueless stoves. Mr. Buchan (Edinburgh) mentions two dressmakers' rooms in which 18.7 and 32.4 parts of CO_2 per 10,000 were obtained. Mr. Brothers (Londonderry) also tested some rooms in clothing factories where radiators had been put in to meet his demands for increased temperature, and found as many as 21 parts of CO_2. In these cases occupiers are informed that such means of warming are not suitable unless adequate means of ventilation are provided as well.

The Lighting of Factories and Workshops.—Dr. Whitelegge (the chief inspector) devotes attention to the natural and artificial lighting of factories and workshops. He says the earlier Factory Acts are silent as to the adequate lighting of workrooms, and even the consolidating and amending Act of 1901 introduces it only as one of the points on which the local authority have to be satisfied before allowing an underground bakehouse to remain in use (section 101). It appears that in the absence of any definition or standard of adequacy, such rough tests as legibility of the Abstract or a newspaper have occasionally been employed by local authorities in the administration of this section, which confers no powers upon the inspectors. In certain orders made since 1901 there is further recognition of the need for light in workrooms; for instance, in the regulations for enamelling and electricity, and in the fruit-preserving order of 1907, under which the special exceptions as to hours, etc., can only be used if the inspector certifies that certain conditions are observed, adequate lighting being one of them. The regulations for docks (1904) and for locomotives (1906) prescribe sufficient artificial lighting for certain places and processes, as necessary for safety.

Having briefly discussed natural light, Dr. Whitelegge proceeds to say that as regards artificial light, considerations of the quality of the light and of the intensity of the source from which it is radiated, that is, glare, arises. It appears that artificial light in which the rays from the violet (actinic) end of the spectrum predominate may on that account be less efficient, at all events for certain kinds of work, and that radiation from a small but intensely luminous source, such as an unshaded electric light, may be more trying to the sight and hence less effective than the same amount of light diffused from a larger surface. The subject, Dr. Whitelegge adds, cannot be settled by a stroke of the pen, but requires close investigation. As a beginning, Mr. D. R. Wilson has been instructed to inquire into the present lighting of certain classes of workshops, beginning with underground bakehouses in London.

Suction Gas Plants.—Mr. H. M. Robinson, deputy chief inspector, says that all the district inspectors speak of the attention given to the proper ventilation of suction gas plants. The memorandum issued from the central office, pointing out the dangers to be guarded against and the precautions to be adopted, has been widely circulated among occupiers. Mr. Bellhouse describes a curious case caused by the discharge of the engine exhaust into a passage in which carts stood while being loaded at the factory. Eight horses were affected by the fumes and died.

Mr. White (Swansea) reports one fatal accident, as follows:

"The deceased was about to start his engine, and had given the fan a few turns, but had not yet got the engine to start, with the result that there was a slight back pressure in the producer. He then went on to the top of the producer (about 7 feet high) and opened both the lower and upper slides of the hopper, so as to pour in his charge of coal. Whilst he was doing this the back pressure in the producer caused the gas to flow into his face. This caused a faintness and giddiness in deceased's head, and he reeled and fell from the top of the producer to the floor below. Medical evidence proved that deceased had inhaled carbon monoxide, but not in sufficient quantities to be fatal—death being due to a fracture of the base of the skull."

Gas Works and Water Gas.—Mr. A. P. Vaughan, superintending inspector, Southeastern Division, reports that attention has long been paid to structural and administrative details in gas works, and no cases of badly-constructed or badly-ventilated purifier houses are reported. A fatal accident which occurred in the Kent district during the year, however, illustrates dangers of water gas plant. In regard to this accident Mr. Bremner Davis (Kent) reports:

"A case, with one fatal result, occurred during the year in a water gas plant recently installed in a gas works. The wrought-iron duct

1. *Gas World.*

leading from the blowing fans to the generator was shattered and the man was struck by pieces of it. The case is important as indicating a danger probably existing in many similar plants and which might be better guarded against than it generally is. The operator's evidence showed that the plant pressure had been tending to be high during the day, but while he knew there was a little, he did not consider that serious blocking of the scrubber was taking place. After the explosion, however, it was found that there had been a block there, and this necessarily meant that the pressure must have risen considerably and possibly in quite a short interval. Unfortunately, the operator did not realize the danger of this and was not certain that he had looked at the generator gauges just before he opened the blast valve in the usual course. Immediately it was opened the explosion occurred in the blast duct. Gas can get into this only in two ways, either by leakage past the valve faces when the valve is closed or by overcoming or forcing back the blast pressure when the valve is opened; and this can happen only if the pressure on the generator side is greater than that of the blast. In this instance leakage past the closed valve can be excluded. The valves are of excellent design and construction, with double faces and a powerful wedge action for sealing them. It was proved that the faces were not corroded. Above all, however, the space between the two faces is ventilated to the open air. Even if both faces did leak, in itself excessively improbable with an uncorroded valve, the vent prevented any gas getting back against the blast pressure into the duct. It is, therefore, practically certain that when the valve was opened a back rush of gas took place by reason of the high pressure; this formed an explosive mixture with the air, and the red-hot generator ignited it. I happened to be almost an eye-witness, as I was close to the place at the time, and so had an unusual opportunity of first-hand information.

Since then I have visited many water gas plants, and have found present, in many of them, some or all of the following sources of danger whose existence might lead to a similar explosion. No separate pressure gauge on the blast pipe side of the blast valve, or one placed some distance from the other gauges, so that comparison between them is awkward and likely to be omitted by the operator. They should be close together, on the same scale and level, so that the difference between their levels is patent to the eye. Those in charge have not realized that it is essential to safety that these two gauges in particular should be observed and compared by the operator immediately before the blast valve is opened on every occasion. This, with properly placed gauges, occupies only a fraction of a second. The usual large relief opening was provided in the ducts in the case in point, and unfortunately the idea is widespread that explosions are thereby rendered of small moment. This was effectually disproved by the accident in question, and it is no more to be expected that a thin steel duct of large diameter should be kept from fracture by relief openings than a gun barrel would be by its opening to the barrel, were its metal proportionately thin. Practically no gun construction yet evolved will stand really high explosives, and yet there is a free opening of the barrel. The explanation, well enough known to those concerned, need not be mentioned here.

Interlocking gear in other parts of the apparatus is fitted by some makers, in order to prevent incorrect relative movement of different valves, and acts excellently. To prevent this wrong opening of the blast valve, however, while interlocking gear is not impossible, it would be complex, and, perhaps, be apt to get out of order. It could be dene by a differential mechanism operated by pistons, or diaphragms, connected with each of the two pressures; or by an electrical make and break within the glass of a differential gauge, with a relay and electro magnetic, or even weight or spring-actuated locking mechanism.

Water gas operators are usually intelligent and reliable men, and if they are made to realize the point, and provided with the simple appliances before named, there would be reasonably adequate protection against explosion from the cause in point.

Gas Heated Laundry Irons.—Mr. Aug. Lewis, superintending inspector, Southwestern Division, says that a matter respecting which all doubt appears now to have been removed is the necessity for connecting the fume pipes of all gas ironing machines in laundries with an efficient fan exhausting into the open air. Mr. Cowell (Plymouth) makes mention of workrooms wherein he found large burners for heating irons without any means provided for taking away the fumes. They were generally placed in front of a fireplace, because the occupiers thought the fumes would pass up the chimney. The effect was the opposite; the heat of the irons rose in front of the fireplace and caused the air of the room to be hotter than the air in the chimney, and the fumes were therefore carried across the room. In most cases hoods were fitted in such manner that the heat from the stove caused an up-draught in the chimney, and several occupiers have admitted that the alteration made the workroom more pleasant to work in.

Mr. G. F. Sedgwick (Leicester) reports that active measures have been taken to get hoods and ducts provided to all the gas stoves and gas rings so commonly used in wearing apparel workshops for heating the pressing irons. Except in the country places, it is now rare to find these means of carrying off the fumes missing. Mr. Garvie (Wolverhampton) says that bad vapors from both hand and machine irons still give trouble, occupiers excusing themselves from installing further fans by spasmodic activity in cleaning the faulty irons. Mr. Nicholl (Lincoln) reports that the manager of one laundry pointed out an improvement he had made in his ironing room. Gas-heated hand irons had been removed, and were replaced by ordinary irons heated on gas stoves of his own invention, placed at arm's length in front of the workers, thus not only removing the products of combustion from under the workers' heads, but also making it possible to fix hoods and ducts to remove the fumes.

A Rickety Gas Works.—Mr. Walmsley (Leeds) reports that it was noted on visiting a small gas works in a country town that the smoke stack was over a foot from the perpendicular, and seemed likely to fall; the wall behind the retorts was slipping away from the roof, a roof principal was broken and propped up by 2 feet of plank, placed on end on the top of the not too strong hollow brickwork forming the flues, and the purifiers were in an unventilated outhouse and leaked badly. The company were requested to undertake repairs promptly, which they did. New works are, he adds, in course of erection.

Central Station Electric Rate Factors.

The Wisconsin Railroad Commission some time ago printed in full the decision and various papers relating to the case of the Madison Gas and Electric Company, which involved the regulation of central station rates. This document is also printed as an appendix, comprising 184 pages, of the report submitted at St. Louis by the Public Policy Committee of the National Electric Light Association. The decision was rendered March 10, and its main points were partially reported at the time. The following details are from the full publication:

The Commission in its analysis of the rate question involved considered that the cost of rendering electric service for lamps and motors is made up of two elements, namely: (1) a fixed charge independent of the number of hours per year the consumer uses his installation; (2) an operating or variable charge dependent on the number of kw-hours used. The fixed charge is dependent on the consumer's maximum demand on the station or at the time of the station peak load of the year, while the varlable charge is dependent on the kw-hours as registered by meter. The Commission used two methods of analysis to determine the relative amount of the fixed and variable charges, which are divided into consumer and demand charges. The consumer charges are independent of the amount of the consumer's installation and practically the same for all consumers. The demand charges are proportionate to the maximum demand which the consumer creates and the output proportionate to the kw-hours.

In one analysis which the Commission makes, the total expenses of giving service amounting to $172,376.37 are divided as follows: Consumer charge, $28,952.07 (17 per cent.); demand charge, $37,212.43 (21 per cent.); output charge, $106,211.87 (62 per cent.) Analyzing the expenses by another method somewhat less complicated, which consists simply of regarding items of the same or similar nature, such as taxes, depreciation, interest and profits as the demand expenses, and classing practically all other items as output expenses, the Commission finds that the demand expenses amount to $71,864.17 (42 per cent.), while the output expenses are $100,512.20 (58 per cent.) This, of course, is for the entire electric service of all classes.

The lost and unaccounted-for energy for the year ending June 30, 1909, was 14.43 per cent. for all classes of service, including that supplied to the street railway company. The lost and unaccounted for being practically negligible in the case of the energy sold to the street railway, of course, brings the general average higher. The lost and unaccounted-for energy supplied to incandescent service was 20.54 per cent.; that to arc service, 6.68 per cent., and to motor service, 21.86 per cent.

The load curves of the various classes of service show that the peak load for the year 1909 occurred December 21 and amounted to 2,056

kw. The peak loads of the different classes of service, namely, incandescent lighting, power, arc lighting and street railway, occur at different times of the year. Had the maximum demands of all branches of the service occurred at the same time, the peak load would have been 2,583 kw. instead of 2,056 kw. The diversity factor of the different classes was, therefore, about 1.25. That is, the maximum demand would have been 1.25 times the actual peak load had the maximum demands of the different classes of service occurred simultaneously. Of the instantaneous maximum demand or peak of the year, 67.12 per cent. was for incandescent service, 6.42 per cent. for arcs, 8.71 per cent. for power, and 17.75 per cent. for the street railway.

The ratio of maximum demand to connected load is an important element in figuring rates. The Commission found that, for the year ending June 30, 1909, on the alternating current lighting system of the company, the maximum station demand was 27.23 per cent. of the connected load for the direct current motor circuits of the company, the maximum station demand was 12.74 per cent. of the connected motor load.

The Commission points out that there is a close relation between the maximum instantaneous peak and the company's investment. It is necessarily the highest demand that determines station capacity and more remotely the cost of buildings, accessories and distribution equipments.

The Commission went very thoroughly into the matter of the relation of the connected load of consumers to the total cost of service. The decision points out that proper assessment of the variable or output cost of production is easily and equitably made by means of watt-hour meters. The distribution of fixed or demand cost, on the other hand, is a more difficult matter. Such charges are only properly apportioned when each consumer is charged for the part of the demand occasioned by him at the time of the station peak. Since such peak demands frequently shift as the company develops or fails to develop its outpeak business, a distribution of the burden of capacity cost is only fair to individual consumers when they are given compensation for economies they effect by a more diversified use of future service.

One of three methods is usually followed to determine the additional demand consumers place upon the central station. In many cities meters registering the maximum individual demand are installed. Regular readings are taken and the capacity cost assessed on the basis of the demand indicated. This method has drawbacks which seriously affect the practicability of employing it in some cities, in the opinion of the Commission. It necessitates an additional expense item often out of proportion to the returns secured from the individual consumer. It gives no idea of the time the demand occurred and hence penalizes the off-peak load. It is doubtful whether it can be successfully employed with small and short-hour residence users, of which the company at Madison has an especially large number, and several companies which have been its most ardent advocates have, according to the Commission, abandoned its use for this class of business.

In several cities the number of rooms have been made the basis of estimating the demand for residences. This method, again, while it has much to recommend it, does not seem suited to Madison. It fails to differentiate between the small residence illuminated almost entirely with gas, and the small electrically lighted apartment, or between the large residence and the large rooming house.

A third method frequently used is to apportion demand cost upon the total or some designated portion of the connected load.

Where uses to which all the consumers put service are similar, the total connected load is perhaps the best divisor of capacity cost, since it assumes that the relative proportion of the actual demand to the total connected load is constant and does not differ considerably as between separate consumers.

Some idea of the demand placed on the central station by residence and business districts can be obtained from demand-meter readings at transformers supplying typical districts. Results obtained in this way in the city of Madison indicate to the Commission that the relation of total residence demand to connected load is from 15 per cent. to 20 per cent., and that the relation of total business demand to connected load is from 55 per cent. to 50 per cent. The Commission also recognizes that the demands at the station of the various consumer classes differ in themselves.

In Madison the average residence installation consists of 16.8 lamps. The most prevalent installation is one of 10 lamps. The average residence installation in Madison is smaller than in Manitowoc or Marinette previously investigated by the Commission. The sales per amp per year and per consumer per year for Madison were larger than for Marinette and Manitowoc.

From demand-meter readings taken by the company in Madison on several typical private houses, rooming houses and fraternities, from a close inspection of residence lighting during the peak hours, and from data gathered from four cities having extensive experience with demand-meters, the Commission finds that an average active or maximum load of 50 per cent. of the connected load is not unfair for residences in Madison. This percentage of demand tends to decrease with the size of the installation.

As to the maximum demand of stores, data gathered from four cities in which Wright demand meters are extensively used indicates individual consumer's maximum demands as ranging from 40 per cent. to 100 per cent. of the connected load with a prevailing ratio of 70 per cent.

For offices data furnished the Commission by companies in five cities using demand meters give the average ratio of actual demand to connected load of 57 per cent., 65 per cent., 75 per cent. and 68 per cent. to 87 per cent.

For restaurants the ratio of the separate consumer's demands to the connected load as indicated by Wright demand-meter readings in three cities from which the Commission has data ranges from 52.3 per cent. to 62 per cent.

In saloons data from four cities using Wright demand meters gives an average ratio of the separate consumer's demand to the connected load of 62.6 per cent., 64 per cent. to 87 per cent., 76.4 per cent. and 92 per cent.

For factory lighting data gathered from three cities in which demand meters are used gives strikingly close ratios of consumer's demand to connected load, namely, 54.4 per cent., 53.5 per cent. and 56 per cent.

For churches the demand data from three cities relating to the consumer's demands and connected loads give ratios of 56 per cent., 85 per cent. and 81.7 per cent.

For hotels, data gathered from two cities using demand meters gives average ratios of consumer's demand to connected load of 28 per cent. and 28.4 per cent.

For livery stables, data from two cities in which demand meters are used gives average ratios of consumer's demand to connected load of 52.3 per cent. and 58.3 per cent.

For lodge and dance halls, data from one company using Wright demand meters with sufficient number of consumers to permit generalization indicates an average ratio of consumer's demand to connected loads of 68.6 per cent.

For depots, data furnished from two cities using demand meters place the ratio of consumer's demand to connected loads at 75 per cent. and 95 per cent.

For theaters, data furnished from two cities using demand meters place the ratio of consumer's demand to connected loads for this class of service at 49 per cent. and 89 per cent.

For the different classes of business in Madison, the Commission found that the average hours' daily use of the total connected load for the year were as shown in the accompanying table.

Average Hours per Day Service is in Use.

Residences	0.705	hours.
Stores, exclusive of window and sign lighting	1.590	"
Offices	0.700	"
Restaurants	3.951	"
Saloons	2.192	"
Factories	1.438	"
Churches	0.478	"
Hotels	3.609	"
Clubs	1.435	"
Schools	0.404	"
Laundries	2.113	"
Livery stables	2.063	"
Lodge and dance halls	0.84	"
Halls of apartment and office buildings	1.785	"
Depots	2.572	"
Theaters	0.974	"
Blacksmith shops	0.351	"
Machine shops	0.868	"
Carpenter shops	0.379	"
County and Federal buildings	5.517	"
University of Wisconsin	0.520	"
Power load	0.854	"

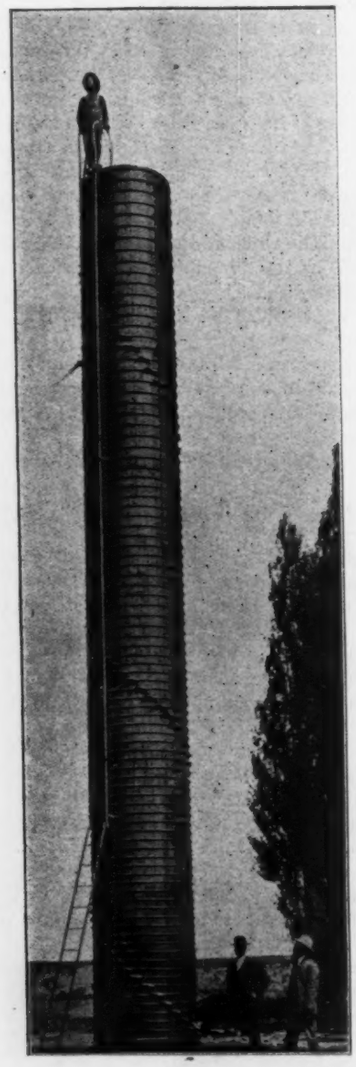


Fig. 1.—Continuous Wood Stave Standpipe at Walla Walla, Wash.

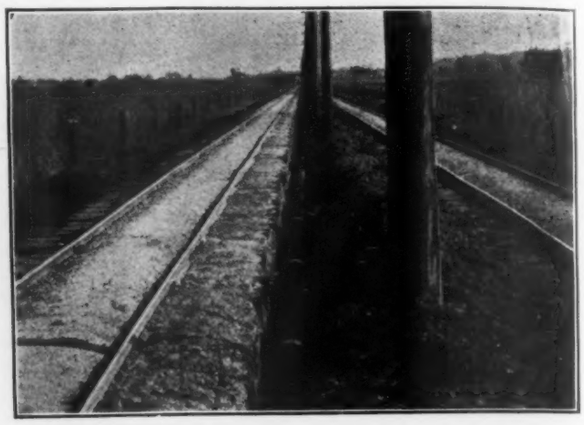


Fig. 2.—Continuous Wood Stave Pipe Along Electric Railway. Displacing Cast Iron Pipe Destroyed by Electrolysis.

Fig. 3.—Continuous Wood Stave Pipe Inverted Siphon, Near Basin, Wyo.

Machine Banded Continuous Stave-Wood Water Pipe.

By Mr. Frank C. Perkins, Buffalo, N. Y.[1]

During the past decade many installations of wood water pipes have been put in throughout the West for the city service, for irrigation and for hydro-electric power systems, as well as for standpipe service. An example of the latter use of wood water pipe is indicated in illustration, Fig. 1, which shows a standpipe erected for the city water system of Walla Walla, Wash. This standpipe was constructed 64 inches in diameter and to a height of 46 feet. It was made of continuous stave pipe and is used as a pressure regulator, there being an overflow pipe inside of the standpipe. One of the advantages of wood pipe over cast iron or steel is that it is not affected by electrolysis, and it is therefore of value when a pipe line must be installed near an extensive electric railway system. The accompanying illustration, Fig. 2, shows a 64-inch, machine-banded, redwood pipe which operates under a head of 150 feet along an electric railway line in the West, and which was laid to replace a line of metal pipe that was completely destroyed by electrolysis in less than two years.

An inverted siphon is shown in the accompanying illustration, Fig. 3, used for irrigating purposes near Basin, Wyo. This inverted siphon is 48 inches in diameter and carries the water across the valley, following the profile of the country exactly with very little excavation, and indicates clearly the method employed in the Western

1. "Municipal Engineering."

Fig. 4.—Continuous Wood Stave Power Conduit, Near Walla Walla, Wash.

States for conveying water, not only for irrigation purposes, but also for hydro-electric power services.

An examination of a 58-inch continuous stave pipe for the latter use is indicated in the accompanying illustration, Fig. 4, showing where the water conductor passes through the tunnel in the side of the mountain. This hydro-electric power pipe is more than 28,000 feet in length, and conducts the water for operating the turbine in the electric generating station, which supplies current for the electric lights and for operating the street railway for the city of Wallla Walla, Wash. The illustration shows one of the trestles on this line and one of the several tunnels through which the pipe runs on its way to the power plant. The lowest point on one of the trestles is under 300 feet head, which is equivalent to 130 pounds pressure per square inch. A remarkable incident, which shows the reliability of this form of water pipe, may be mentioned, which is of special interest. The trestle, at the point above mentioned in this pipe line during a freshet two years ago last spring, was washed out, leaving the pipe suspended in mid-air for a span of 60 feet without injury to the pipe and without leakage of water. Of course, this would be impossible with iron or steel pipe on account of its enormous weight, and shows one of the advantages to be gained by the use of the machine-banded and continuous-stave wood water pipe in addition to its low cost.

Fuel Calorimetry.

Early last month, at a meeting of the London (England) Section, Society Chemical Industry, held at Burlington House, London, Dr. J. Lewkowitsch presided, and Mr. J. Nevill Huntley, F.I.C., read a paper on the "Accuracy Obtainable in Fuel Calorimetry." The author, who is one of the staff of Gas Examiners of the London County Council, has had much experience with the Boys calorimeter for determining the calorific value of gas; but on this occasion he dealt almost entirely with the determination of the calorific power of coal and other solid fuels in the bomb calorimeter of the Berthelot-Mahler type.

He stated that the limit of accuracy of work with the bomb calorimeter using a mercury thermometer was about 2 parts in 1,000; but rather a greater degree of accuracy was attainable if an electrical resistance thermometer was used. The Beckmann type of mercury thermometer, which has a scale divided into one-hundredth of a degree, and the range of which is limited to 5° or 6° C., cannot, according to Mr. Huntley, be read more accurately than to one tenth of a division, or one-thousandth of a degree Centigrade. But so far as fuel calorimetry is concerned, he considers this degree of accuracy fictitious, because the terminal points of the limited scale are set according to a thermometer which is graduated in tenths of a degree, and the readings of the Beckmann thermometer consequently are dependent on the accurate calibration of the thermometer with the less open scale against which it has been set. Hence there is no real advantage in bomb calorimetry in using the Beckmann type of thermometer in place of a good thermometer graduated in tenths of a degree.

The merits of the French, German and English makes of thermometer were discussed by the author, who pointed out the difficulty of reading thermometers with an enamelled background when the top of the column of mercury happened to coincide with one of the lines of the scale. The finest lines are used on French thermometers; and these have a width of 0.2 mm. Since 1 mm. represents approximately .1°, it will be seen that when the top of the mercury column coincides with one of the lines on the scale, it is impossible to read exactly, unless the thermometer has a clear glass background, and can be turned round so that the reading may be made with the scale at the back.

The author proceeded to discuss the corrections which were required in a thermometer to insure absolute accuracy; and he enumerated the following seven corrections which were necessary in precise thermometry: (1) Calibration; (2) for external pressnre; (3) for internal pressure; (4) for change of zero; (5) for the value of a degree; (6) the stem correction; (7) for reduction to the hydrogen scale. Of these, calibration was the most important. The certificates given for thermometers by the Reichsanstalt gave the calibration corrections; but those issued by the National Physical Laboratory did not give the calibration corrections, but merely the general correction deduced from the results of comparison with a standard thermometer. The limit of accuracy in a mercury thermometer, in practice, was about 1 in 1,000.

The most important point in bomb calorimetry was the determination of the water equivalent of the instrument. This was usually done by the makers, and engineers and others adopted the figure so given without any idea of the limits of accuracy of the methods employed for determining the figure. There were three methods, of which that of burning a given quantity of a substance of known calorific power—such as naphthaline, benzoic acid or sugar—was the most common. But the determinations of the calorific power of (*e.g.*) naphthaline made by Berthelot and other observers with extreme care differed by 1 to 3 parts in 1,000, and consequently that represented the extreme limit of accuracy of the determination by this method of the water equivalent of the calorimeter. The more accurate method was that of putting a known quantity of heat into the calorimeter by an electric current, which was accurately measured. Other sources of error in bomb calorimetry were due to the assumption that the specific heat of water was constant, which is, of course, not the case, and to radiation and evaporation. Regnault's formula for the radiation correction was the basis of those generally used.

In conclusion, however, Mr. Huntley pointed out that the real difficulty in obtaining useful results in fuel calorimetry was the difficulty of sampling fairly a material such as coal. With the methods of hand sampling generally followed, however carefully they were carried out, two samples would not agree more closely than ± 0.5 per cent. in respect of the determination of either ash, moisture, or calorific power. With the sampling machines which were in use in the United States (and in which a very large quantity of coal was crushed) the results on two samples would agree more closely. The error due to sampling was in any case as great as, or greater than, the possible errors of calorimetry if the calorimetric determinations were made with proper care. It was, however, in any case futile to return the results of determinations of the calorific power of fuel to the fourth figure, as the differences in consecutive determinations made with care frequently affected the third figure.

Dr. Brame, at the invitation of the Chairman, spoke a few words, in which he expressed his appreciation of the value of Mr. Huntley's paper, and emphasized the importance of the accurate sampling of coal and other fuel.

Report of Refractory Materials Committee.

Not the least in excellence respecting the technical presentations made at the last meeting of The Institution of Gas Engineers (the 14th, 15th and 16th ults., Storey's Gate, London, England) is the "Report of the Refractory Materials Committee." It had to do with the work accomplished on the indicated lines during the interim of the meetings and the investigation. Messrs. James W. Helps, Chairman, and Messrs. E. Allen, John Bond, A. E. Broadberry, H. G. Colman, W. D. Gibb, Thomas Glover, Thomas Goulden, D. H. Helps, W. R. Herring, Edward Jones, James Patterson, S. Y. Shoubridge, Alex. Wilson, H. W. Woodall and F. J. Bywater—the last-named is the Hon. Secretrry—the larger number of whom are of international fame in the gas industry, are to be congratulated over that which they accomplished. The report, for which we are indebted to the *Journal of Gas Lighting*, is appended:

It was thought essential, before giving any consideration to the question of the quality of retort and firebrick material generally, to have authoritative information with regard to the results obtained from material now available, the temperatures at which various parts of retort and water gas plants are worked, etc., and for this purpose enquiry forms were sent out to a number of representative gas works in Great Britain and Ireland. At the same time the opportunity was taken to inquire the views of engineers of those works, as to the desirability of preparing standard specifications for the manufacture and testing of the various kinds of refractory material employed on gas works, the possibility of standardizing some of the patterns of retorts, the institution of an independent testing laboratory, and other questions bearing on the subject.

It was recommended that the various temperatures should be taken by the same pyrometer, so that the information might be as comparable as possible.

A very satisfactory number of replies were received; both small and large undertakings being included in the returns.

The information sent in has been summarized, and is given below.

Number of undertakings sending returns.	31
Number of works.....	48
Total make of coal gas represented.....	270 million per diem.
Total make of water gas represented....	49 " "

Coal Gas.

Number of beds of retorts represented, 2,059 (of these 1,748 are horizontals, 310 are inclined, 1 vertical).
Pyrometers used—Féry, 35; others, 8; not mentioned, 5.
Kind of retorts used—Moulded, 33 works; segmental, 12 works; not given, 3 works.
Life of retorts—Without patching, average, 797 days.
With patching, " 1,257 "
Life of combustion chambers—Average 1,321 "
Temperatures—Retorts.....Average maximum 1,909° F.
" minimum 1,558° F.[1]
Comb't'n chambers " maximum 2,397° F.
" minimum 2,212° F.
Producers..... " maximum 1,966° F.
" minimum 1,766° F.
Regenerators..... " maximum 1,622° F.
" minimum 1.220° F.

Water Gas.

Number of sets represented—63.
Temperatures—Generator....Average maximum 1,811° F.
" minimum 1,489°
Carburettor.. " maximum 1,381°
" minimum 1,014°
Superheater.. " maximum 1,290°
" minimum 1,142°
Average life of generator lining (without repairs)—187 days. Repairs usually required consist of replacing the lining about 4 feet up from the bars.
Total life of generator—This varies in the returns from 1½ to 17 years. When the repairs above mentioned have been executed, the life of generator linings in the majority of cases appears to be about 8 to 10 years.
Life of carburettor (without repairs)—Very few repairs required.
Lining. Returns vary from 4 to 13 years. Many original linings still untouched.
Checker work. Considerable repairs appear to be required to a portion of the material. Some plants require repair half yearly, others yearly—the latter being in the majority.
Total life of carburettor—See note above. Varies considerably.
Lining. Checker work. Average of returns about 700 days.
Life of superheater (without repairs)—Very little repairs required. Original lining still remaining in many plants. Average 415 days.
Lining.
Checker work.
Total life of superheater—See note above. Varies very considerably according to the extent of the repairs executed annually.
Lining. Chequer work.

List of Questions Appended to the Inquiry, and Replies Thereto.

1. *Remarks and Criticisms on Material now Available.*—3 are satisfied; 5 fairly satisfied; 15 dissatisfied, or say room for improvement; 2 dissatisfied, but say that gas committees and companies are partly to blame for making cheapness the first consideration; 9 give no answer.

2. *Sizes of Ordinary Bricks Employed.*—Almost without exception the ordinary bricks used are 9×4½×3 inches, or 9×4½×2½ inches.

3. *Size of Retorts.*—23 installations of horizontals, 22×16 inches; 12 installations of horizontals, 21×15 inches; 6 installations of inclines, 24-21×16 inches; 19 installations of irregular sizes.

4. *Adoption of a Standard Pattern for Retorts.*—24 object, or would only adopt in case of new work; 6 have no objection; 2 doubtful; 2 do not answer question.

5. *Preparation of Standard Specification.*—26 in favor; 2 doubt practicability; 2 against; 4 do not answer question.

6. *Method of Testing Refractory Material.*—7 perform no tests; 17 put bricks into combustion chambers or settings; 3 have testing furnaces; 3 make practical tests of all new material; 4 do not answer question.

7. *Foundation of Independent Testing Laboratory.*—16 favorable without reservation; 6 favorable with some reservation. Generally as to locality, expense of maintenance, etc.; 2 doubtful; 5 against; 5 do not answer question.

The opinions expressed in replying to the above questions will very materially assist the Committee in arriving at a decision on the various points raised, and several engineers make valuable suggestions when replying to Question 1.

1. The minimum temperature on the bottom of retorts is much less than this immediately after charging, and a special investigation of the subject has been made by means of an electric recording pyrometer, for the purpose of obtaining the greatest variation of temperatures which the material has to withstand. Records as low as 800° F. have been obtained at this point.

The subject of standardizing ordinary bricks has been sometimes raised; but it would appear that no interference with present custom is called for.

The standardization of retorts has also been recommended at intervals ever since retorts have been used, but has always been complicated and rendered almost impossible by engineers having their own ideas on the matter of the most suitable cross sections to be employed.

The replies to Queries 3 and 4 indicate the difficulties of the question.

A close examination of the cross sections of the large number of 22-inch by 16-inch retorts now used, however, reveals the fact that there are now serious differences between many of the patterns; and this is being looked into further, with a view to attempting, if possible, standardization in this size of retort.

The replies to Questions 5 and 7, relating to the preparation of standard specifications, and to the foundation of an independent testing laboratory, indicate that these will be welcomed if some obvious difficulties can be overcome. There will, of course, have to be several specifications according to the requirements of the material.

It will thus be seen that we have a very comprehensive statement of the opinions of engineers on this subject, and of the temperature at which retort and water gas plants are worked, and the "life" obtained from material employed.

It is considered that this will be of great assistance to manufacturers, whom it will guide in the selection of their clays for making material to be used in various parts of plant, and will enable them to reserve their best clay for those which have to withstand the highest temperatures and severest working conditions.

The statements of temperature cannot, of course, be considered final or exact for all conditions, but a suitable allowance above the average figures given can be made, and will provide a safe maximum temperature to be resisted.

After the conclusion of the inquiry, it was decided to hold a conference with the makers of refractory material, for the purpose of discussing the best ways and means of carrying into effect the objects which the Committee have in view. It was thought that the readiest method of reaching the manufacturers as a body would be to invite the Retort and Firebrick Section of the Society of British Gas Industries to assist the Committee in this matter. Unfortunately, the Chairman of the Section, Mr. W. P. Gibbons, was abroad at the time, but in his absence the Secretary of the Society was asked to act for him and arrange for the election of a deputation - stress being laid on the desirability of its being representative, not merely of the Retort and Firebrick Section of the Society, but of the whole body of manufacturers. The following is a list of the gentlemen who attended, and the firms they represent:

Mr. A. Cliff.....	Messrs.	Williamson, Cliff, Ltd.
Mr. W. Barrett	"	Leeds Fire Clay Company.
Mr. A. H. Pearson..... ...	"	Harris & Pearson, Ltd.
Mr. J. Morton.....	"	Joseph Morton, Ltd.
Mr. G. H. Perry.....	"	Mobberley & Perry, Ltd.
Mr. C. W. Thomas	"	E. J. & J. Peason, Ltd.
Mr. G. H. Timmis.....	"	Timmis & Co.

Mr. A. L. Griffiths, Secretary of the Society of British Gas Industries.

The deputation were informed of the work which the Committee had already carried out and the results of the inquiry, and the whole subject of the supply of refractory material was thoroughly discussed. The manufacturers expressed their satisfaction at having placed at their disposal the useful information in regard to the temperatures which the material they supplied had to withstand, and signified readiness to do everything they could to make the quality of their material equal to the required standards.

Ultimately, it was unanimously decided that the first thing to do was to draw up standard specifications for the manufacture and testing of the various kinds of refractory material, and a joint sub committee was elected for this purpose. It was also arranged that they should have the advice of a professional clay expert to assist them in this work.

The Committee informed the deputation that it was their wish for the specification to be at first as simple as possible, and that it should be amplified from time to time as necessity proved was desirable.

As indicated in the annual general report of the Institution, these specifications will probably be ready before next season's requirements of retorts and firebricks have to be ordered, and it is hoped engineers will avail themselves of them when making their contracts for this material.

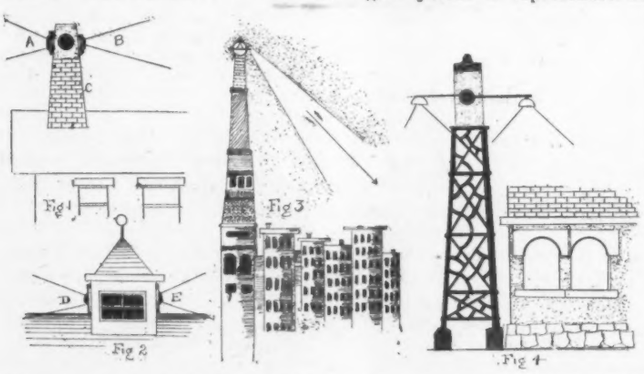
Tower Lights.

Prepared for the JOURNAL by "R."

Modern tower lights are used under three heads: First, lights for casting a brilliancy over the landscape, lawn, street or sidewalk of the residence; second, for advertising purposes; third, for illuminating exterior industrial work when the work is going on at night.

Referring briefly to these classes of tower lights, one finds that the house tower-light is the result of the attic or cupola window light. There were times in the past when the signal light of the tallow dip, torch or other illuminant, meant something when its rays were made to spread through darkness from some elevated point. The tower lights of the lighthouse on the dangerous shore are, of course, in another class, and these kinds of lights have been so greatly improved in mechanical conditions and application within the past 10 years that they are now about as near perfect as it seems possible to get them. The tower light of the rich man's house is created after the principle involved in the lights of the lighthouse of the sea, but on a much smaller scale. The light tower of a modern residence is exhibited in Fig. 1. It consists of the erection of a brick tower, about the size of a common brick stove chimney, except that it is made roomier, is usually cone-shaped to make it strong, and is furnished with a light apartment at the top. The stack *C* carries the gas main from the house line up to the fixtures in the tower. A remarkably small burning gas jet, if properly furnished with reflectors and lenses, can be made to cast a bright, white light quite a way into the blackness of the night.

The expense of running such a light is not great. In the event that the owners of the house wish to provide rays of light for lighting the driveway of the estate from the tower, then more powerful lights are needed. The outline of the 2-sided light system is represented in



this cut, at *A* and *B*. Still a third and fourth extension of the light can be made by having the four sides of the tower provided with lenses; the latter are chiefly oval pieces of plate glass. There are specially constructed condensers, with lenses and an adjusting thumb-screw, for some of the more complete equipments of tower lights. Ordinarily the common jet answers the purpose. The beacon tower light of the country residence is a great thing for travellers. The light on the top of the barn or garage is a welcome sight for travellers on the dark country roads. Sometimes the tower light of the house is arranged to shoot from the cupola, as at *D* and *E*, Fig. 2. The employment of an old stereopticon is not at all amiss in some cases. For illustration, a party wished to have a miniature searchlight to cast rays of illumination about the gardens of his house. He secured a second-hand moving picture machine hood, with condensers and lenses, and with these strong glasses was able to send the rays into the darkness of the yard like a searchlight of a warship. Yet the light was made by using only a gas arc. The arc was adjusted on the regular carrying frame of the lantern hood of the device and could be moved as desired to get best results.

In Fig. 3 is shown one of the plans adopted to utilize the tower light system for advertising purposes. It consists in the utilization of some high tower in a city.

Powerful gas arc lights are provided. The rental of a tower is possible for this purpose, as no damage is done to the tower except the fastening of pipe fixtures for conveying the gas to the lights from the body of the building. Towers of town halls and towers of churches are in this class. The advertising man makes his arrangements for the use of certain elevations, and he proceeds to bid for the advertising of the local merchants or the big advertisers of the country. From the tower he can throw light upon signs fixed to adjoining building tops, readable from the streets. The signs can be created with common building top stock. The signs are seen in the daytime, but at night become invisible because of the darkness, and the mission of the tower light for advertising purposes in a metropolis is to throw the search lights upon these signs in the shadows and illuminate them.

The tower light for industrial work at night is shown in Fig. 4. Portable steel frame towers are made for this purpose. Ordinarily the night light for working parties can be strung with wires or fixtures to a projection of the staging of the building in course of erection, but in the event of the work being very extensive, and covering a number of buildings, the specially designed tower, as shown in the cut, is employed. Such a tower can be put up for illuminating the work in progress at night in a quarry. Perhaps work is to be done on the public streets that requires night service and tower lights, in which case an arrangement of this kind can be utilized. The gas mains can be tapped quite readily for getting the gas for the arc lights.

Items of Interest
FROM VARIOUS LOCALITIES.

THE mains of the Superior (Wis.) Water, Light and Power Company have been extended to and through the public ways of the outlying settlement known as Billings Park.

THE Kelsey-Brewer Company, the headquarters of which operating concern are in Grand Rapids, Mich., has purchased the property and franchises of the Citizens Gas Light Company, of Kankakee, Ills. Under this acquisition the syndicate controls the lighting of Kankakee through its prior purchase of the local electric light and power plant.

MANY of our readers will remember Mr. A. Naito, who visited many of our American works during the continuance of the St. Louis World's Fair or the World's Fair in St. Louis, some years ago. He was then interested in the construction of the Tokyo (Japan) gas works, and he is now Construction Engineer of the Omri gas works, with headquarters in Tokyo.

MESSRS. EZRA DAVAL and Walter T. Soper, respectively President and Treasurer of the Taunton (Mass.) Gas Light Company, have handed in an amended petition to the Board of Gas and Electric Light Commissioners, under which they seek sanction to extend the main system to and through the streets of the nearby settlements of Dighton and Berkley.

THE Rochester (N. Y.) Railway and Light Company is proposing to extend its main pipes to the village of North Greece—an extension of perhaps 2½ miles; and still they say that Manager Searles is not looking after the gas section of Rochester's busiest enterprise; in fact, the determination noted rather savors of looking forward than backward.

WRITING of Rochester recalls to mind the fact that the plant of the Canandaigua (N. Y.) Gas Light Company, which is controlled by interests that are closely identified with the Rochester Company, which has been under reconstruction for some time, will be ready for operation the 1st prox. The new plant is capable of putting out 160,000 cubic feet *per diem*, or well over double the capacity of the one that was dismantled. It is of the coal gas type.

THE County Commissioners, responding to the petition of the proprietors of the Fort Worth (Tex.) Gas Company, have granted the latter permission to pipe the settlements known as Polytechnic Heights, Handley and Arlington. Under the agreement the Company's franchises at the named places will have a life of 25 years.

"V. W. R.," writing from Boston, under date of the 2d inst., incloses the following: "The rate for gas in Charlestown and that section of Somerville supplied by the Charlestown (Mass.) Gas and Electric Light Company, is to be reduced 5 cents per 1,000 cubic feet, the concession to date from the 1st prox., thus putting the selling price at 85 cents. This action was taken following an order issued some days ago by the Board of Gas and Electric Light Commissioners. Two petitions were originally made to the Board in respect of this action, the first of which asked for an improvement in the quality of the gas furnished, and the second prayed that such improved quality be made in company with a lower rate for service. As to the first plaint the Board found that the inferior quality complained of at the

time was the result of defects in the service, a condition so remedied since that the Board finds the present supply quite in accordance with the standards fixed by law. As to the plaint for a reduction the Board pointed out that the Cambridge Company, which supplies a part of the city of Somerville, is supplying its product at 85 cents, and while the two Companies operating side-by-side are different in some respects, they buy their product in the same market and their expenses are practically identical.

THE shareholders of the Evansville (Ind.) Gas and Electric Light Company, in annual meeting last June, re-elected the retiring Board of Directors, who, in turn, named the following executive organization: President, H. D. Walbridge; Vice-President, B. C. Cobb; Treasurer and General Manager, A. O. Blinn; Secretary, F. J. Haas. From this list it will be noted that Mr. E. G. Schmidt is no longer officially connected with the Company.

THE plant of the Deadwood-Lead (S. D.) Gas Company was badly damaged by fire the afternoon of June 27th. Gross carelessness seems to have been the inciting cause, for the press despatches say: "The fire started from hot ashes dumped near a section of woodwork."

THE Easton Power Company, the Easton Gas Light Company and the Easton Fuel Gas Company, all of Easton, Pa., have been merged into a single corporation to be known as the Easton Gas and Electric Company. The officers of the new corporation are: President and Treasurer, B. F. Cresson; Vice-President, Fred. B. Drake; Secretary, T. F. McPherson.

IN a newsy, very welcome letter, to hand the 5th inst., and signed by a gas man whose reputation is international, we quote the following extract: * * * I had just parted from A. H. Barret, who spent the morning with me. He looks finer than I had ever seen him looking. Healthy, happy and as free from care as a boy with life opening before him, carrying all its anticipatory joys. He has just returned from California, and dressed like a Beau Brummell, he surely is indifferent to responsibilities. To show that he has quit business for keeps seems borne out by this statement: A few days ago someone offered him $500 to attend to some business that would have required his attention 2 hours a day for 10 days; but he replied to the proposition that he would not walk across the street for any sum, if the latter were out of his way or interfered with his inclination. * * * Mr. Barret certainly earned his right to his ease, and that his journeyings will be for many years, will undoubtedly be the earnest wish of his legions of friends.

MR. PETER C. BEDLINGTON, for quite a period in the service of the New Amsterdam (N. Y.) Gas Company, died at his home, 535 Broadway, Elizabeth, N. J., June 25th. The funeral services were held the afternoon of Saturday, the 2d inst., the Rev. Dr. Otis A. Glazebrook officiating. Interment was made in the Rosedale Park Cemetery, the committal service being rendered by the Rev. Brockholst Morgan.

"MR. MOSES BYRNE, an employer of the Cleveland (O.) Gas Light and Coke Company since 1876, died at his home in that city, the morning of June 12th. He was in his 58th year, having been born in Wexford, Ireland, June 6th, 1851. The funeral services were held in the Church of the Immaculate Conception, and interment was made in Calvary Cemetery, Cleveland. Having seen no mention of his death in the JOURNAL, and believing that the faithful and efficient service rendered by him to the Cleveland Company should have some recognition at the JOURNAL'S hands, I ventured to send you the above, and hope you will find place for it in your columns.—J. T. W."

A MORTGAGE in the sum of $100,000, to secure an issue of bonds aggregating $100,000, has been executed by the proprietors of the Annville and Palmyra Gas and Fuel Company, the plant for which is under construction at the last named place, the Valley Trust Company, of Palmyra, being the Trustee.

"A. T. L.," writing from Baltimore, Md., under date of the 2d inst., incloses the following: "The gas rate from yesterday for small consumers in this city will be 90 cents per 1,000 cubic feet, and to the larger ones 85 cents. The schedule, which was agreed on last April, is as follows: For a consumption of less than 50,000 cubic feet per month, $1 per 1,000, less 10 cents discount per 1,000 if paid within 10 days—under the old schedule it was $1 per 1,000, up to a consumption of 100,000 cubic feet: 50,000 to 100,000 cubic feet, net, 85 cents per 1,000; over 100,000 cubic feet, 80 cents per 1,000. These rates will also apply in the suburban districts reached by the Company's mains—of these suburbs there are not less than 30, some of which have several thousand residents—Canton, Towson, Highlandtown, etc. The Company has perhaps 93,000 consumers on its books, and within recent years. owing to the many miles covered, sub stations at which gas bills may be paid have been established in all sections of the city, a plan that has brought the Company many good words—the main office is right in the center of the shopping district. The main mileage of the corporation is certainly not less than 600."

THE Schenectady Illuminating Company and the Mohawk Gas Company, of Schenectady, N. Y., have moved from the Parker Building to handsome new quarters at State and Clinton streets, especially arranged and fitted up for the business purposes of the named corporations. General Manager M. Webb Offut says that the formal opening of the offices will be made about mid-July, and he promises that all will find a hearty welcome and good entertainment.

A VERY interesting and fraternal gathering was that which marked the retirement of Mr. George H. Finn, as General Manager of the New England Gas and Coke Company. The affair was a banquet given the retiring officer by Mr. James L. Richards, President of the Company, who also acted as Toastmaster. The banquet room was in the premises of the Algonquin Club, and those who participated in its pleasures included the officers of the various Companies affiliated with the Massachusetts Gas and Coke Company.

MR. W. W. RANDOLPH has been retained by President Daly, of the East Ohio Natural Gas Company, to value the artificial gas properties of Cleveland, in connection with the franchise which it is proposed to issue respecting the continuance of the supply of artificial gas in that city. What a difference in practice! The city authorities employ a nondescript "expert" named Marks; the gas men retain a gas engineer, known the world over for his capacity as an engineer and as a man whose work as an expert is to guide his employers aright, whereas the aim of the other man is to—well, to juggle with figures rather than to debate upon facts.

MR. E. L. PEARSALL, formerly Superintendent of the "implement department" of the Altoona (Pa.) Gas Company, has been appointed General Manager of the Susquehanna Light, Heat and Power Company's gas and electric properties at Bloomington, Ills.

THE Nashville (Tenn.) *Banner* of June 28th said: "With Messrs. J. T. Havell, J. H. Fall, T. G. Tinsley and William Nelson as incorporators, the Nashville Gas and Fuel Company has filed application for a charter to work under in Nashville—to do business in that city on a capital stock of $100,000. The application for the charter is the second step in the proceedings begun some time ago to sell the stock of the Nashville Gas Company to Eastern capitalists, and every indication points to a final successful culmination of the plan. The incorporators represent Eastern capitalists who have looked over the plant and have, it is understood, signified their willingness to buy the stock at the option figures if a franchise can be secured from the city, the old franchise being comparatively near its end."

THE quarterly distribution of stock in the New Haven (Conn.) Gas Light Company to its employees under the terms of the Company's profit-sharing plan was made the 1st inst. Over $50,000 of market value of the Company's shares can now be traced to employee ownership.

THE clever stewardship of Superintendent B. F. Bullock, of the Fredericksburg (Va.) City Gas Works, still bears good fruit, judging from the report for the year's operations recently submitted by the Superintendent. That the gain has been wonderful is shown in this resume. The new works went into operation in 1906, and the gain for that twelvemonth over 1905 was 109 per cent. Since then the relative percentage gains have been: 1907 over 1906, 78 per cent; 1908 over 1907, 45 per cent.; 1909 over 1908, 22 per cent.; 1910 over 1909, 11 per cent. Further, the expense for operation in the last twelvemonth over that for the operation of the old plant in 1905 is less than 24 per cent. higher. The rate there is $1 per 1,000.

THE gas and electric properties in Shamokin, Pa., which were formerly known under the somewhat non-euphonius title of the Shamokin and Coal Township Light, Heat and Power Company, and which we heretofore noted, have come under the control of the newly organized Pennsylvania Lighting Company. The present owner, in order to put the plants in proper shape, has authorized the Gas Machinery Company, of Cleveland, O., to construct at Shamokin a water gas plant, to consist of 2 water gas sets, purifiers, boilers, exhauster, station meter, oil storage tank and connections and miscellaneous machinery.

The Market for Gas Securities.

After a week of vacillation and a slight change in quoted values, it looks at this writing (noon, Friday) that a swift movement on the increasing side is on in Consolidated. The bid price at noon was 133¼ to 133½, and we believe, from the nature of the buying, which can be traced to people who are not all unfriendly to certain large financial interests in the Company, that the deferred readjustment of the finances of its allied interests is at hand.

Brooklyn Union is somewhat steadier, and a like remark applies to all gas shares usually quoted. The move is started in Washington gas, which shows a gain of 10 points, and which is likely to show a gain of 50 more; 78 was bid for it Wednesday. With Congress out of the way, it is said the Company will shortly refund its 4's ($600,000) and its certificates ($2,600,000) bearing 6 per cent., by an issue of $3,500,000 bonds (five's), and the ordinary shareholders will be made participants in a very large cash dividend.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

JULY 11.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$73,177,000	100	133¼	133½
Central Union Gas Co. — 1st 5's, due 1972, J. & J.	3,000,000	1,000	98	101
Equitable Gas Light Co.— Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.— 1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River— 1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union— 1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	132	135
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¼	107
Yonkers	399,650	509	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	¾	⅝
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	509,000	1,000	90	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	73½
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,028,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	106½	—
Mortgages, 6's	3,600,000	—	99	100
Cheapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	881,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	30	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis	10,000,000	100	97	97½
Preferred	2,500,000	100	90	100
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108½
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	79½	80¼
Preferred	25,000,000	100	91	92
Montreal Gas Co., Canada	2,000,000	100	218	218½
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	105¼	105½
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.— 1st Mtg. 5's	751,000	1,000	100	102
Washington (D. C.) Gas Co.	1,600,000	200	380	390
1st Mortgage, 6's	600,000	—	—	—

Advertisers' Index.

New advertising, or changes in standing ads., to assure attention the issue following their reception, must be in hand on Wednesday.

AMMONIA CONCENTRATORS.

Bartlett-Hayward Co., Baltimore, Md. 89
Fred Bredel Co., Milwaukee, Wis. 86
Michigan Ammonia Works, Detroit, Mich. 66
The Gas Machinery Co., Cleveland, O. 23
Western Gas Construction Co., Fort Wayne, Ind. 48

BURNERS.

Wm. M. Crane Co., New York City 80

CEMENTS AND CONCRETES.

C. L. Gerould, New Castle, Pa. 84
Ernst Strassburger, Chicago, Ills. 84
Glidden Varnish Co., Cleveland, O. 66
Laclede-Christy Clay Products Co., St. Louis, Mo. 74

CHARGING BARROWS & COAL WAGONS.

Davis & Farnum Mfg. Co., Waltham, Mass. 88
Kerr Murray Mfg. Co., Fort Wayne, Ind. 91
The Stacey Mfg. Co., Cincinnati, O. 92

COKE CRUSHERS.

Bartlett-Hayward Co., Baltimore, Md. 89
C. M. Keller, Columbus, Ind. 87

CONVEYORS—ALL KINDS.

Bartlett-Hayward Co., Baltimore Md. 89
Brown Hoisting Machinery Co., Cleveland, O. 74
Cruse-Kemper Co., Ambler, Pa. 76
C. W. Hunt Company, New York City 78
Fred Bredel Co., Milwaukee, Wis. 86
G. A. Bronder, New York City. 85
Kerr Murray Mfg. Co., Fort Wayne, Ind. 91
The Gas Machinery Co., Cleveland, O. 23
The Stacey Mfg. Co., Cincinnati, O. 91
Western Gas Construction Co., Fort Wayne, Ind. 48

EXHAUSTERS.

Connelly Iron Sponge & Governor Co., New York City 85
Connersville Blower Company, Connersville, Ind. 92
Davis & Farnum Mfg. Co., Waltham, Mass. 88
Isbell-Porter Company, Newark, N. J. 75
Kerr Murray Mfg. Co., Fort Wayne, Ind. 91
Piqua Blower Co., Piqua, O. 77
The P. H. & F. M. Roots Co., Connersville, Ind. 79

GAS AND WATER PIPES.

Davis & Farnum Mfg. Co., Waltham, Mass. 88
Donaldson Iron Co., Emaus, Pa 80
R. D. Wood & Co., Philadelphia, Pa. 94

GAS BLAST FURNACES.

American Gas Furnace Co., New York City 72

GAS COALS.

Berwind-White Coal Mining Co., New York and Phila. 86
Westmoreland Gas Coal Co., Philadelphia, Pa. 87

GAS COCKS.

H. Mueller Manufacturing Co., Decatur, Ills. 69

GAS ENGINEERS.

Bartlett-Hayward Co., Baltimore, Md. 89
Cruse-Kemper Co., Ambler, Pa. 76
Davis & Farnum Mfg. Co., Waltham, Mass. 88
Drakes Limited, Halifax, England. 67
Edwin E. Witherby, New York City. 66
Evens & Howard Firebrick Co., St. Louis, Mo. 71
Frank D. Moses, Trenton, N. J. 80
Fred Bredel Co., Milwaukee, Wis. 86
Frederick J. Mayer, New York City 90
Glenn Marston, New York City 66
Henry I. Lea, Chicago, Ills. 88
H. M. Byllesby & Co., Chicago, Ills. 88
H. Thurston Owens, New York City 66
Humphreys & Glasgow, New York City. 88
Improved Equipment Company, New York City. 81
Isbell-Porter Co., Newark, N. J. 75
Kerr Murray Mfg. Co., Fort Wayne, Ind. 91
Laclede-Christy Clay Products Co., St. Louis, Mo. 74
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 84
Quintard Iron Works, New York City. 77
R. D. Wood & Co., Philadelphia, Pa. 94
The Gas Machinery Co., Cleveland, O. 23
The Stacey Mfg. Co., Cincinnati, O. 91
The United Gas Improvement Co., Philadelphia, Pa. 82
Western Gas Construction Co., Fort Wayne, Ind. 48
William A. Baehr, Chicago, Ills. 66
William W. Randolph, New York City. 81

GAS ENRICHERS.

Standard Oil Co., New York City 39

GAS GAUGES.

The Bristol Co., Waterbury, Conn. 80

GAS GOVERNORS.

Chaplin-Fulton Mfg. Co., Pittsburg, Pa. 85
Connelly Iron Sponge & Governor Co., New York City. 75
Evens & Howard Firebrick Co., St. Louis, Mo. 71
Isbell-Porter Co., Newark, N. J. 75
Pittsburg Meter Co., East Pittsburg, Pa. 78
Reynolds Gas Regulator Co., Anderson, Ind. 95

GASHOLDERS.

Bartlett-Hayward Co., Baltimore, Md. 89
Chicago Bridge and Iron Works, Chicago, Ills. 70
Cruse-Kemper Co., Ambler, Pa. 76
Davis & Farnum Mfg. Co., Waltham, Mass. 88
Deily & Fowler Mfg. Co., Philadelphia, Pa. 92
Kerr Murray Mfg. Co., Fort Wayne, Ind. 91
R. D. Wood & Co., Philadelphia, Pa. 94
Riter-Conley Mfg. Co., Pittsburgh, Pa. 68
The Stacey Mfg. Co., Cincinnati, O. 43
Western Gas Construction Co., Fort Wayne, Ind. 96

GAS MAIN STOPPERS.

Safety Gas Main Stopper Co., New York City. 87

GAS METER CONNECTIONS.

H. Mueller Manufacturing Co., Decatur, Ills. 69

GAS METERS.

American Meter Co., New York and Philadelphia. 95
D. McDonald & Co., Albany, N. Y. 93
Helme & McIlhenny, Philadelphia, Pa. 95
John J. Griffin & Co., Philadelphia, Pa. 94
Keystone Meter Co., Royersford, Pa. 94
Maryland Meter and Mfg. Co., Baltimore, Md. 94
Metric Metal Co., Erie, Pa. 95
Nathaniel Tufts Meter Co., Boston, Mass. 94
New York Improved Meter Co., New York City. 78
Pittsburg Meter Co., East Pittsburg, Pa. 78
Rotary Meter Co., New York City. 93
Sprague Meter Co., Bridgeport, Conn. 93

GAS PLANT TOOLS.

H. Mueller Manufacturing Co., Decatur, Ills. 69

GAS STOVES.

American Meter Co., New York and Philadelphia. 95
Keystone Meter Co., Royersford, Pa. 94
Maryland Meter & Manufacturing Co., Baltimore, Md. 94
Nathaniel Tufts Meter Co., Boston, Mass. 94

GAS TAPPING MACHINES.

George Light, Dayton, O. 87
H. Mueller Manufacturing Co., Decatur, Ills. 69

GAS WORKS APPARATUS AND CONSTRUCTION.

Bartlett-Hayward Co., Baltimore, Md. 89
Connelly Iron Sponge & Governor New Co., York City. 85
Cruse-Kemper Co., Ambler, Pa. 76
Davis & Farnum Mfg. Co., Waltham, Mass. 98
Deily & Fowler Mfg. Co., Philadelphia, Pa. 79
Evens & Howard Firebrick Co., St. Louis, Mo. 71
Fred Bredel Co., Milwaukee, Wis. 86
Gas Engineering Co., Trenton, N. J. 80
Humphreys & Glasgow, New York City 78
Improved Equipment Company, New York City. 81
Isbell-Porter Co., New York City 75
Kerr Murray Mfg. Co., Fort Wayne, Ind. 91
Laclede-Christy Clay Products Co., St. Louis, Mo. 74
Lloyd Construction Co., Detroit, Mich. 72
Quintard Iron Works Co., New York City 77
R. D. Wood & Co., Philadelphia, Pa. 94
Riter-Conley Mfg. Co., Pittsburgh, Pa. 68
The Gas Machinery Co., Cleveland, O. 23
The Stacey Mfg. Co., Cincinnati, O. 91
The United Gas Improvement Co., Philadelphia, Pa. 83
Western Gas Construction Co., Fort Wayne, Ind. 48

HIGH PRESSURE GAS GOODS.

H. Mueller Manufacturing Co., Decatur, Ills..... 69

HOT WATER HEATERS.

Humphrey Co., Kalamazoo, Mich..... 72

INCANDESCENT GAS LAMPS.

General Gas Light Co., Kalamazoo, Mich..... 73
Welsbach Company, Gloucester, N. J..... 82

INCLINED RETORTS.

Baltimore Retort and Firebrick Co., Baltimore, Md... 84
Didier-March Co., New York City 90
Evens & Howard Firebrick Co., St. Louis, Mo..... 71
Fred Bredel Co., Milwaukee, Wis..... 86
Gas Bench Construction Co., St. Louis, Mo..... 87
Improved Equipment Company, New York City..... 81
Laclede-Christy Clay Products Co., St. Louis, Mo..... 74
Parker-Russell Mining and Mfg. Co., St. Louis, Mo... 84

MAIN AND SERVICE LAYING.

Sullivan Bros., Flushing, N. Y..... 87

PATENTS, TRADE-MARKS & COPYRIGHTS

Royal E. Burnham, Washington, D. C..... 87

PIPE LINE TOOLS.

H. Mueller Manufacturing Co., Decatur, Ills..... 69

PREPAYMENT METER ATTACHMENTS.

New York Improved Meter Co., New York City..... 94

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia..... 95
D. McDonald & Co., Albany, N. Y..... 93
Helme & McIlhenny, Philadelphia, Pa..... 95
John J. Griffin & Co., Philadelphia, Pa..... 96
Keystone Meter Co., Boyersford, Pa..... 94
Nathaniel Tufts Meter Co., Boston, Mass..... 94
New York Improved Meter Co. New York City..... 94
Pittsburg Meter Co., East Pittsburg, Pa..... 78
Sprague Meter Co., Bridgeport, Conn..... 93

PROCESSES.

Bartlett-Hayward Co., Baltimore, Md..... 89
Fred Bredel Co., Milwaukee, Wis..... 86
Humphreys & Glasgow, New York City..... 83
Improved Equipment Company, New York City..... 81
The Gas Machinery Co., Cleveland, O..... 23
The United Gas Improvement Co., Philadelphia, Pa... 83
Western Gas Construction Co., Fort Wayne, Ind..... 48

PRODUCER POWER PLANTS.

R. D. Wood & Co., Philadelphia, Pa..... 94

PURIFIER AND SCRUBBER TRAYS.

Bartlett-Hayward Co., Baltimore, Md..... 89
Cabot Mfg. Co., Hoboken, N. J..... 87
Western Gas Construction Co., Fort Wayne, Ind..... 48

PURIFIERS.

Bartlett-Hayward & Co., Baltimore, Md..... 89
Connelly Iron Sponge & Governor Co., New York City. 85
Cruse-Kemper Co., Amber, Pa..... 76
Davis & Farnum Mfg. Co., Waltham, Mass..... 88
Evens & Howard Firebrick Co., St. Louis, Mo..... 71
Isbell-Porter Co., Newark, N. J..... 75
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 91
Quintard Iron Works, New York City..... 77
R. D. Wood & Co., Philadelphia, Pa..... 94
The Stacey Mfg. Co., Cincinnati, O 96
The United Gas Improvement Co., Philadelphia, Pa... 83
Western Gas Construction Co., Fort Wayne, Ind..... 48

PURIFYING MATERIALS.

Connelly Iron Sponge & Governor Co., New York City 85
The United Gas Improvement Co., Philadelphia, Pa... 83

REGENERATIVE FURNACES.

Baltimore Retort and Firebrick Co., Baltimore, Md.. 84
Bartlett, Hayward & Co., Baltimore, Md..... 89
Didier-March Co., New York City..... 90
Evens & Howard Firebrick Co., St. Louis, Mo..... 71
Fred Bredel Co., Milwaukee, Wis..... 86
Gas Bench Construction Co., St. Louis, Mo..... 77
Improved Equipment Company, New York City..... 81
J. H. Gautier & Co., Jersey City, N. J..... 84
Laclede-Christy Clay Products Co., St. Louis, Mo..... 74
Missouri Firebrick Co., St. Louis, Mo..... 84
Parker-Russell Mining and Mfg. Co., St. Louis, Mo... 84

RETORTS AND FIREBRICKS.

Baltimore Retort and Firebrick Co., Baltimore, Md... 84
Didier-March Co., New York City..... 90
Evens & Howard Firebrick Co., St. Louis, Mo..... 71
Fred Bredel Co., Milwaukee, Wis..... 86
Gas Bench Construction Co., St. Louis, Mo..... 77
Henry Maurer & Son, New York City..... 77
Improved Equipment Company, New York City..... 81
James Gardner, Jr., Co., Bolivar, Pa..... 89
J. H. Gautier & Co., Jersey City, N. J..... 84
Laclede-Christy Clay Products Co., St. Louis, Mo..... 74
Missouri Firebrick Co., St. Louis, Mo..... 84
Parker-Russell Mining and Mfg. Co., St. Louis, Mo.... 84

SCRUBBERS AND CONDENSERS.

Bartlett-Hayward Co., Baltimore, Md..... 89
Cruse-Kemper Co., Amler, Pa..... 76
Davis & Farnum Mfg. Co., Waltham, Mass..... 88
Evens & Howard Firebrick Co., St. Louis, Mo..... 71
Fred Bredel Co., Milwaukee, Wis..... 86
Isbell-Porter Co., Newark, N. J..... 75
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 91
Quintard Iron Works, New York City..... 77
R. D. Wood & Co., Philadelphia, Pa..... 94
Riter-Conley Mfg. Co., Pittsburgh, Pa..... 68
The Gas Machinery Co., Cleveland, O..... 23
The Stacey Mfg. Co., Cincinnati, O. 91
The United Gas Improvement Co., Philadelphia, Pa... 83
Western Gas Construction Co., Fort Wayne, Ind..... 48

SELF-SEALING MOUTHPIECE DOORS.

Bartlett-Hayward Co., Baltimore, Md..... 89
Davis & Farnum Mfg. Co., Waltham, Mass..... 88
Fred Bredel Co., Milwaukee, Wis..... 86
Isbell-Porter Co., Newark, N. J..... 75
Improved Equipment Company, New York City..... 81
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 91
Parker-Russell Mining and Mfg. Co., St. Louis, Mo..... 84
Quintard Iron Works, New York City..... 77
R. D. Wood & Co., Philadelphia, Pa..... 94
The Gas Machinery Co., Cleveland, O..... 23
The Stacey Mfg. Co., Cincinnati, O..... 91
Western Gas Construction Co., Fort Wayne, Ind..... 48

STOKING MACHINERY.

Fred Bredel Co., Milwaukee, Wis..... 86
G. A. Bronder, New York City..... 85
Laclede-Christy Clay Products Co., St. Louis, Mo..... 74
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. ... 84

STORAGE TANKS.

Bartlett-Hayward Co., Baltimore, Md..... 89
Davis & Farnum Mfg. Co., Waltham, Mass..... 88
Quintard Iron Works, New York City..... 77
The Stacey Mfg. Co., Cincinnati, O..... 91
Western Gas Construction Co., Fort Wayne, Ind..... 48

STREET LAMPS.

Thos. T. W. Miner, New York City..... 67
Welsbach Street Lighting Co., New York and Phila.. 82

TAR AND CARBONIC ACID EXTRACTOR.

Bartlett-Hayward Co., Baltimore, Md..... 89
Fred Bredel Co., Milwaukee, Wis..... 86
Isbell-Porter Co., Newark, N. J..... 75
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 91
The Gas Machinery Co., Cleveland, O..... 23
The Stacey Mfg. Co., Cincinnati, O. 91
The United Gas Improvement Co., Philadelphia, Pa... 83
Western Gas Construction Co., Fort Wayne, Ind..... 48

VALVES.

Bartlett-Hayward & Co., Baltimore, Md..... 89
Davis & Farnum Mfg. Co., Waltham, Mass..... 88
Isbell-Porter Co., Newark, N. J..... 75
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 91
Ludlow Valve Manufacturing Co., Troy, N. Y..... 77
R. D. Wood & Co., Philadelphia, Pa..... 94
The Gas Machinery Co., Cleveland, O..... 23
The P. H. & F. M. Roots Co., Connersville, Ind..... 79
The Stacey Mfg. Co., Cincinnati, O..... 91
Western Gas Construction Co., Fort Wayne, Ind..... 48

VERTICAL S'S.

Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 85
Didier-March Co., New York City..... 90
Evens & Howard Firebrick Co., St. Louis, Mo..... 71
Fred Bredel Co., Milwaukee, Wis..... 86
Gas Bench Construction Co., St. Louis, Mo..... 77
Improved Equipment Company, New York City..... 81
Laclede-Christy Clay Products Co., St. Louis, Mo..... 74
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. .. 84

WATER METERS.

Pittsburg Meter Co., East Pittsburg, Pa..... 78

Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

IMPROVED AMMONIA CONCENTRATOR.

About 130 in use. Write to

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SPECIAL REPRESENTATIVE

GAS MACHINERY COMPANY,

CLEVELAND, O.,

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NEW YORK CITY.

MUNICIPAL STATISTICS.

Information for New Business and Commercial and Municipal Ownership Campaigns. :: :: :: :: ::

CIVIC AND BUSINESS MEN'S ORGANIZATIONS PERFECTED.

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, June 8, 1910.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable July 15th, 1910, to stockholders of record at the close of business, June 30, 1910. Checks will be mailed.

1827-5 LEWIS LILLIE, Treasurer.

1831-1 **DIVIDEND NOTICE.**

AMERICAN LIGHT AND TRACTION CO.,
40 WALL ST., NEW YORK CITY, July 5, 1910.

The Board of Directors this day declared from the net earnings of the Company the regular quarterly dividend of one and one-half per cent. (1½ per cent.) on the preferred stock of this Company, payable Aug 1, 1910, to stockholders of record of preferred stock at the close of business July 16th, 1910. The Board also declared, from the undivided profits of the Company, a quarterly dividend of two and one-half per cent. (2½ per cent.) on the common stock of the Company, payable Aug. 1, 1910, to stockholders of record of Common Stock at the close of business July 16th, 1910. The Board also declared, from the undivided profits of the Company, a dividend of two and one-half (2½) shares of common stock on every one hundred (100) shares of common stock outstanding, payable on or before Aug. 15th, 1910, to stockholders of record of common stock at the close of business July 16th, 1910. The transfer books for both preferred and common stock will close July 16, 1910, at 12 o'clock noon, and will reopen Aug. 1, 1910, at 10 o'clock A.M. C. N. JELLIFFE, Secretary.

Position Wanted.

Experienced gas and electric accountant desires position as accountant or office manager in city of 25,000 or more population; 30 days' notice.

Address, "ACCOUNTANT,"
1831-2 Care this Journal.

WANTED,

Position as General Foreman in Water Gas Plant.

Have had many years' experience in handling men. Some little knowledge of the manufacture of coal gas; understand all kinds of street work; can make and save money for any company desiring my services.

Address, "PROGRESS,"
1831-1 Care this Journal.

WANTED,

Position with parent company operating a string of small plants, as General Superintendent of same. Warrant increased efficiency, yield, etc.

Address, "HUSTLER,"
1831-1 Care this Journal.

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Married man, of practical experience covering a period of 12 years in the management of gas companies' business, desires a change of position. Technical graduate, with best of references. Specializing in high pressure distribution.

1831-1 Address, "H. P.," care this Journal.

WANTED,

A First-Class, All-Round Gasfitter and Meter Repairer.

State age, salary expected and references.

1830-2 Address, "H. L. & R. CO.," care this Journal.

WANTED,

Experienced Man to Operate a 4-Inch U. G. I. Water Gas Set.

Married man preferred.

CLINTON GAS LIGHT COMPANY,
1830-2 CLINTON, MASS.

WORKS FOREMAN WANTED.

Must have experience in manufacturing of coal and water gas and willing to work. State experience and salary expected.

Address, "FOREMAN,"
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FOR SALE.

Station Meter. Good Condition.

Connections and by-pass, 12-inch. Capacity, 38,000 cubic feet per hour.

SCRANTON GAS AND WATER CO.,
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FOR SALE,

One set of 4 purifying boxes 12 feet 8 inches by 10 feet 9 inches by 3 feet, in good condition, with centerseal and 10-inch connections

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FOR SALE AT ATTRACTIVE PRICES.

Blowers.—2 Connersville 68 ft. d.c. to vertical engines; 2 McKenzie, belt; 2 positive gas Sturtevant No. 10, belt, with 2 horizontal engines; 3 Roots No. 6, 37 ft. d.c. to vertical engines.

Exhausters.—1 Connersville 58 ft. belt; 2 Connersville 33 ft. d.c. to vertical engines; 3 Wilbraham 55 ft., belt; 1 Roots 37.25 ft. direct; 2 McKenzie 25 ft., belt; 3 McKenzie 15 ft., belt; 1 McKenzie d.c. to vertical engine.

Engines.—1 Phœnix 11 in. by 14 in. horizontal; two 6 in. by 6 in. vertical; 1 Sturtevant, 4 in. by 6 in. vertical, no wheels. (See Blowers and Exhausters.)

Flywheels.—2 C. I., 8 ft. 6 in. diameter, 26 in. face, 10-in. bore.

Station Meters.—One 12 ft. by 12 ft., no drum; one 9 ft. 6 in. by 9 ft. 6. in., no drum; one 9 ft. by 9 ft.; one 8 ft. 3½ in. by 8 ft; one 8 ft. by 8 ft.

Purifiers.—4 boxes, 20 ft. by 24 ft. by 3 ft. 6 in., with 3 covers.

Holder.—150,000 cu. ft., 2-lift, in brick tank.

Tanks.—Of various capacities and shapes.

Flanged Fittings.—Miscellaneous 16 in., 20 in. and 24 in.

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Electric Gas Lighting,
By H. S. NORRIE.
Price, 50 Cents. For Sale by
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Modern Machine Shop Construction, Equipment and Management, by OSCAR E. PERRIGO, M.E.

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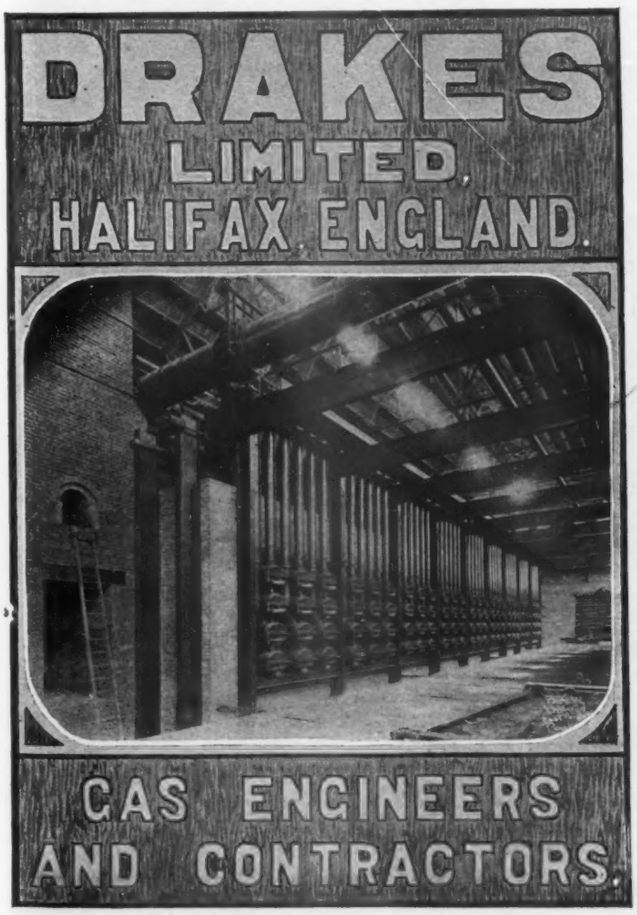

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OVER FORTY YEARS IN USE THE WORLD OVER.
THE BEST STREET LAMPS
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This is only one of a Large Variety of Styles.
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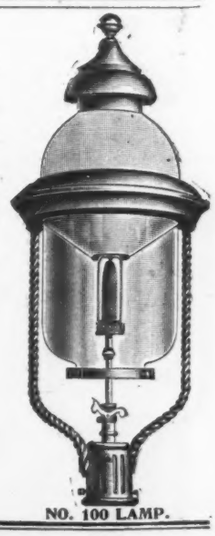
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$1.
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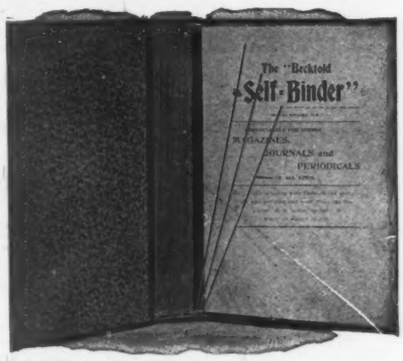

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NEW YORK, N.Y., U. S. A.
254 Canal St. (cor. Lafayette).

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October, 1910. New York City. Officers: President, Wm. H. Bradley, N. Y., City; Secretary, A. B. Beadle, 29 West 39th street, N. Y. City.

Canadian Gas Association.—Annual meeting, June, 1911. ————————. Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1910. New York City. Officers: President, C. R. Huntley, Buffalo, N, Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, December. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, A. K. Quinn; Newport, R. I.; Secretary, Walter G. Africa, Manchester, N. H.

Illinois Gas Association.—Annual meeting, time, March, Chicago, Ills. Officers: President, A. S. Harrington, Chicago, Ill.; Secretary-Treasurer, C. B. Strohn, Elgin, Ill.

Illuminating Engineering Society.—Annual meeting, Baltimore, Md., Oct. 1911. Meetings of Sections, monthly. President, W. H. Gartley, Philadelphia, Pa.; Secretary, Preston S Millar, 29 W. 39th street, N. Y. City. Sections: New York: Secretary, Albert J. Marshall, 227 Fulton street. New England, Secretary, L. D. Gibbs 39 Boylston street, Boston, Mass. Philadelphia, Secretary, F. N. Morton, Broad and Arch streets Chicago, Secretary, T. R. Beebe, 157 Michigan avenue,

Indiana Gas Association.—Annual meeting, January 19, 1911, Fort Wayne, Ind. Officers: President, Carl H. Graf, Indianapolis; Vice-President, S. E. Mulholland; Secretary-Treasurer, Philmer Eves, Indianapolis Gas Company, Indianapolis, Ind.

Iowa District Gas Association.—Annual meeting, time, June, 1911, ————————. Officers: President, Austin Burt, Waterloo, Ia.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association—Annual meeting, time, September, 1910; ———— Officers: President, B. O. Tippy, Grand Rapids, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April 13, 14 and 15, 1911; St. Louis, Mo. Officers: President, R. J. Irvine; Secretary and Treasurer, W. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, December, 1911: Boston. Officers: President, E. N. Wrightington, Boston; Secretary, Louis Stotz, 36 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May ————, 1911; Pittsburgh, Pa. Officers: President, John M. Garard, Secretary, T. C. Jones, Delaware, O. Editor Wrinkle Department, F. W. Stone, Ashtabula, O.

New England Gas Association.—Annual meeting, third Wednesday in February; Boston. Officers: President, W. H. Snow, Holyoke, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

Oklahoma Public Utilities Association.—Annual meeting, May 9, 10 and 11, 1911. Officers: President, E. C. Reynolds; Secretary, Galen Crow, Guthrie, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1910, Los Angeles, Cal. Officers: President, W. B. Cline, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 925 Franklin street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1911, Reading, Pa. Officers: President, J. H. Keppelman, Reading, Pa.; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1910; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 1123 Broadway, New York.

Southern Gas Association.—Annual meeting, Feb. 16, 1911, Montgomery, Ala. Officers: President, H. W. Frund, Salisbury, N. C.; Secretary-Treasurer, Jas. Ferrier, Rome, Ga.

Southwestern Electrical and Gas Association.—Annual meeting: May, 1911, ———— Tex. Officers: President, W. B. Tuttle, San Antonio, Tex.; Secretary, H. B. Head, Stephensville, Tex.

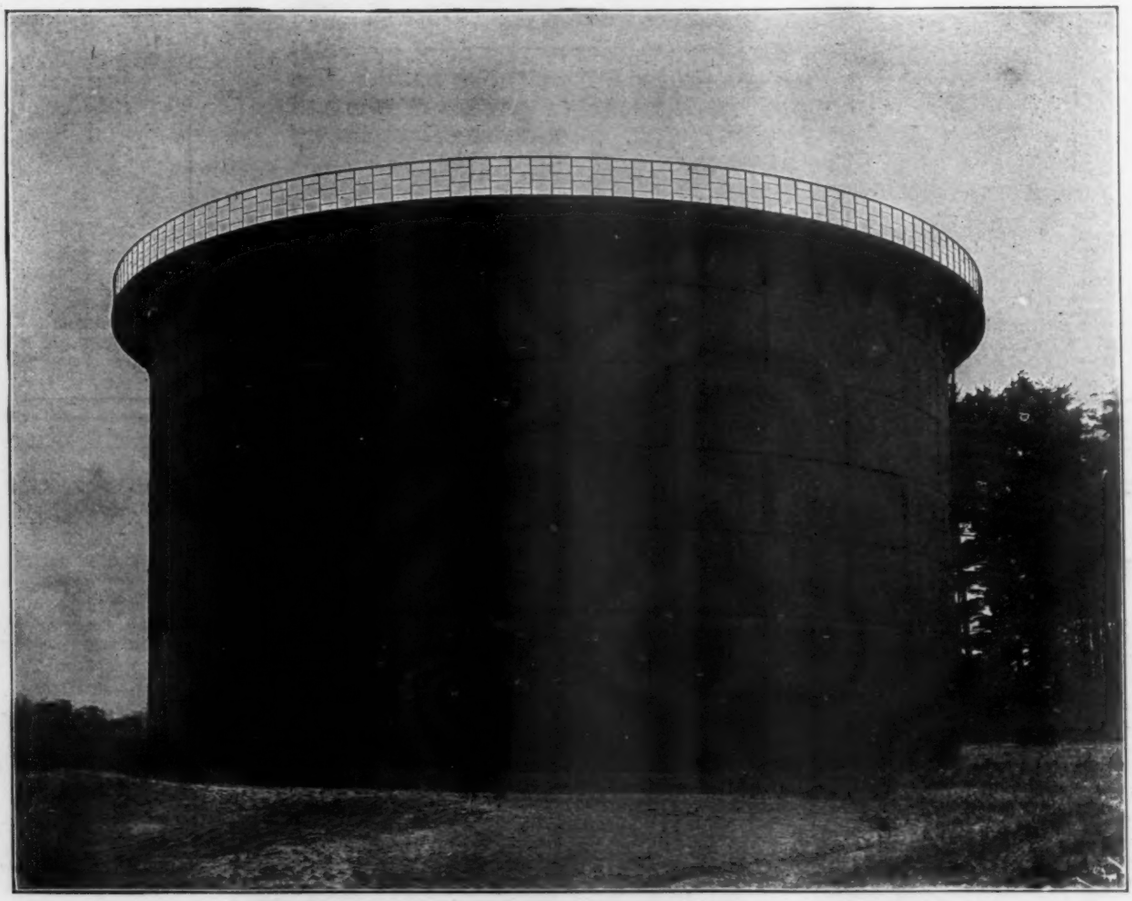
Wisconsin Gas Association.—Annual meeting, May ————, 1911, Milwaukee, Wis. Officers: President, W. H. Winslow, Superior, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.

Directory of American Gas Companies, 1909. Price, $5.00. For Sale by A. M. Callender & Co., 42 Pine St., N. Y.

GAS HOLDERS,

STANDPIPES—OIL TANKS—SCRUBBERS—WATER TOWERS,

DESIGNED, CONSTRUCTED AND ERECTED.



Capacity, 2,380,000 gallons. **SCHENECTADY, N. Y.** City Water Works. Diameter 90 feet. Height, 50 feet.

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EVENS & HOWARD FIRE BRICK CO.

You are acting against your own interests if you do not ask us for bids on your benches. We and other manufacturers are doing as much as most gas companies to improve the design and quality of benches, and every user of retorts is benefiting by our determination to supply the very best work. If other manufacturers do not and will not give you ***hammer set work*** and ***brick settings,*** the fault is as much yours as theirs.

IN

1870

we were experienced bench builders and retort makers, having at that time had 14 years of hard work achieving and perfecting knowledge of clay working.

This is a photograph of 3 bricks taken from a large pile pulled out from benches built in 1870.

NOW, IN

1910,

you are still able to buy the best from us at moderate prices. With your help we will continue to keep up quality.

The company that built benches of E. & H. material in 1870, according to plans prepared by their own engineer (filed at Washington, according to Act of Congress, in 1870), resolved to give us a trial one week after we restarted our gas works division in 1908. The result was repeat orders as follows:

NOTE
from One Company.

- 10 benches, January, 1908.
- 20 arches and benches—20-foot throughs, April, 1910.
- 8 benches of fours, June 1st, 1910.
- 6 benches of fours, June 2d, 1910.

Are you not neglecting your opportunities and standing in the way of your company's interests if you do not take advantage of our desire and willingness to serve?

Gas Works Division, - - A. S. B. LITTLE, Engineer.

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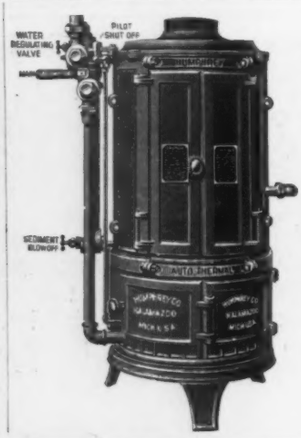

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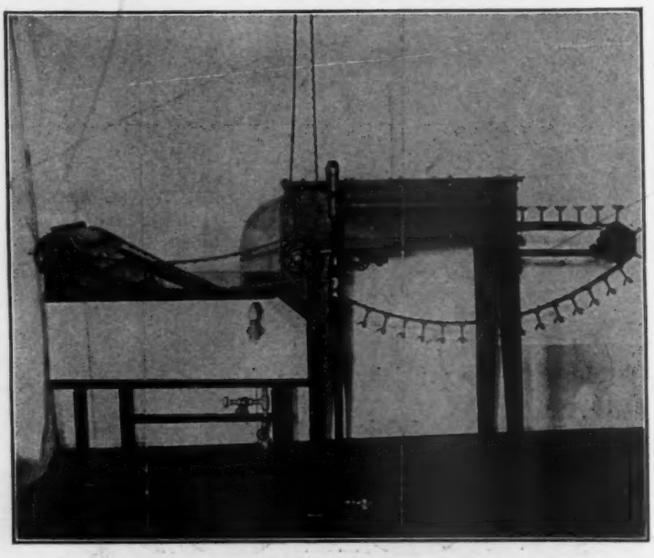

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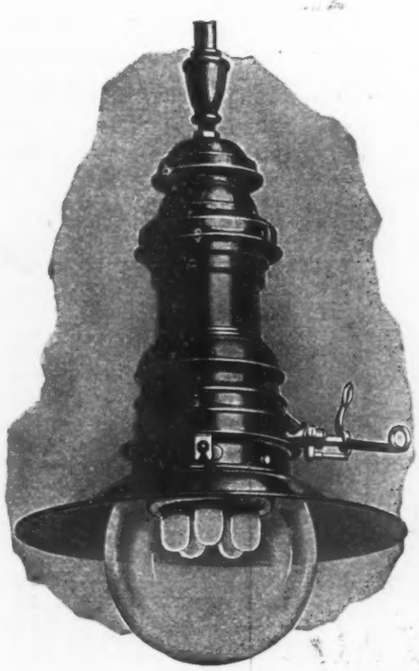

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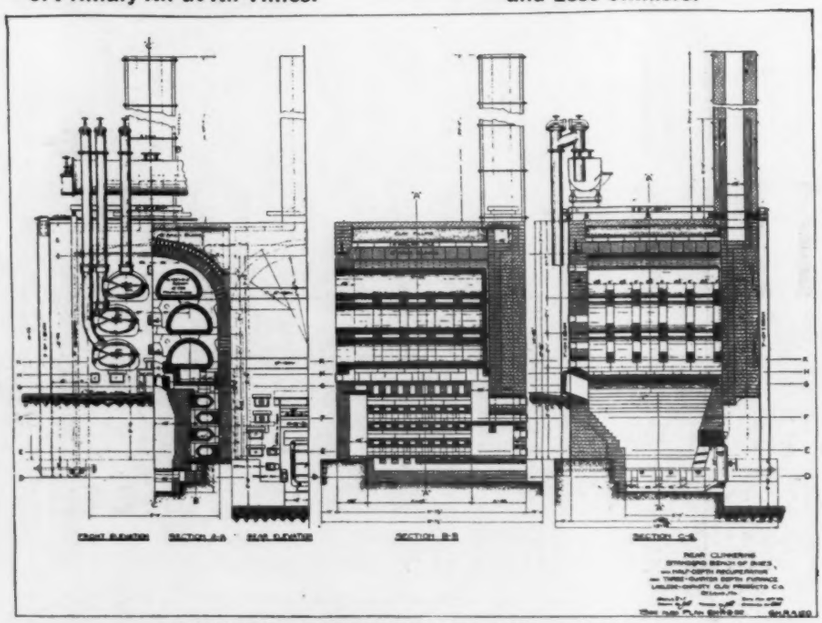

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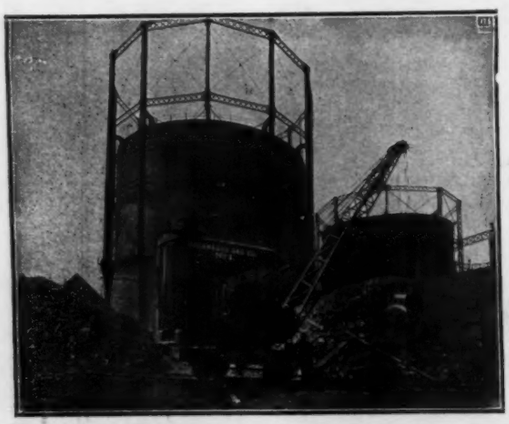

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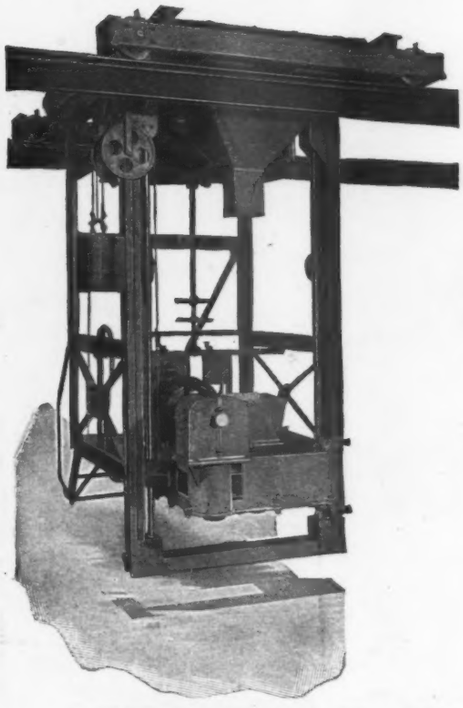

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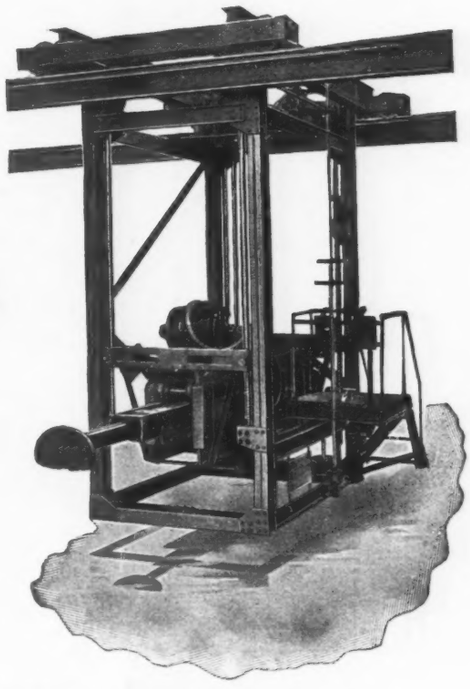

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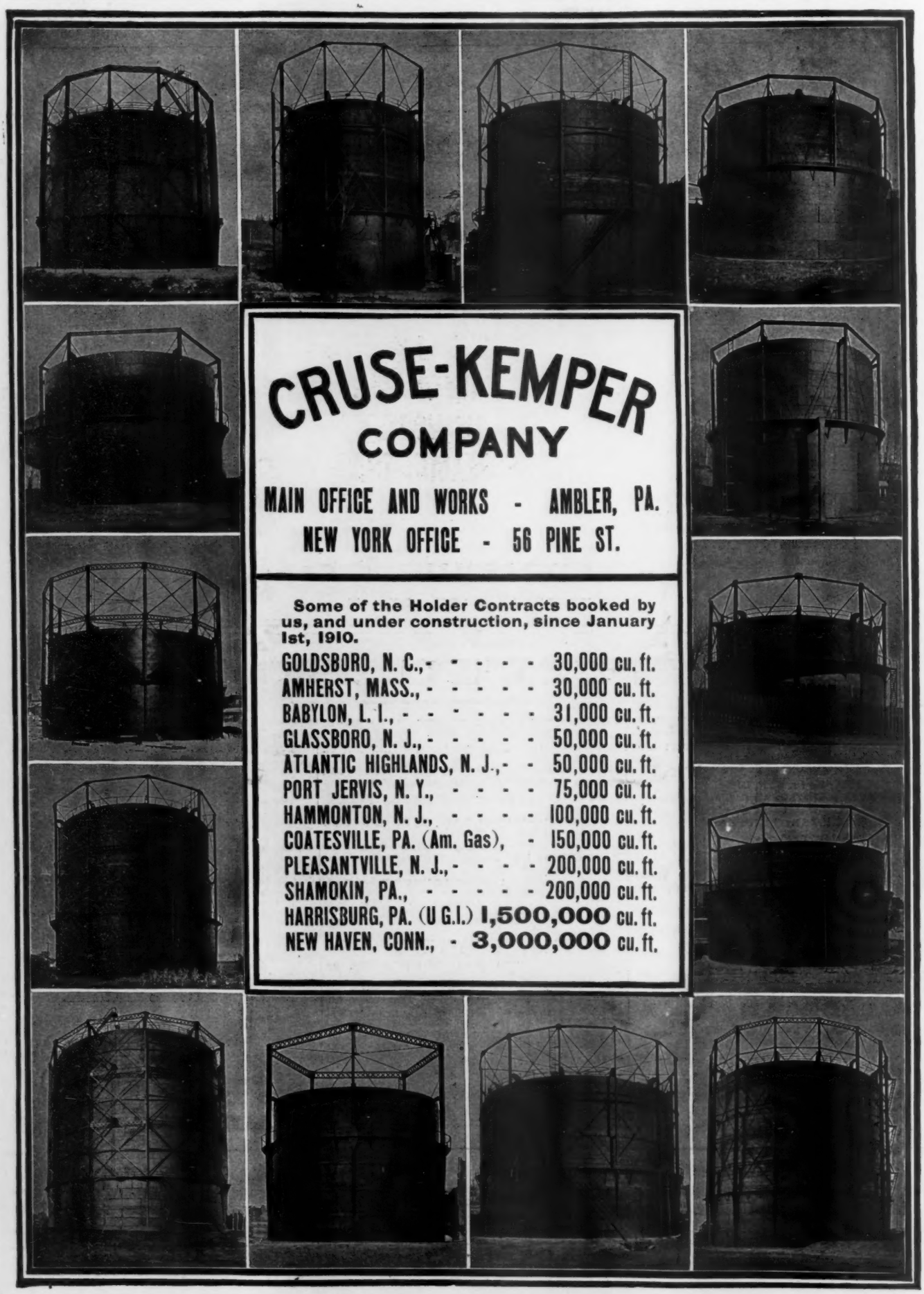
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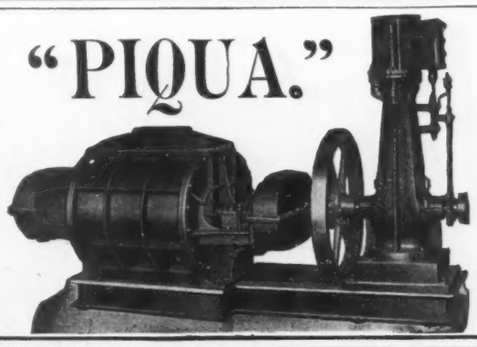

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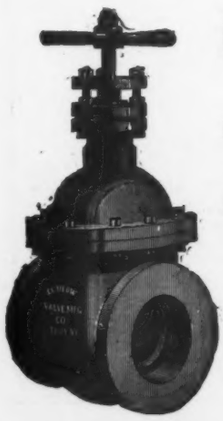

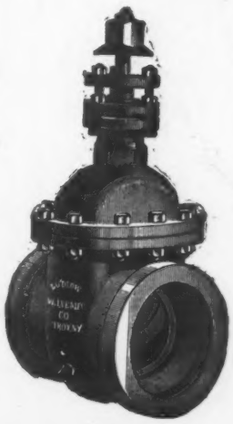

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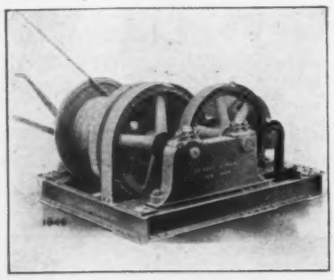

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		P.M.				P.M.	A.M.
Fri.	1	8.00	2.00 A.M.	Fri.	1	7.27	3.07
Sat.	2	8.00	2.30	Sat.	2	7.22	3.07
Sun.	3	8.00	3.40	Sun.	3	7.22	3.07
Mon.	4	8.00	3.40	Mon.	4	7.22	3.07
Tue.	5	8.00	3.40	Tue.	5	7.22	3.07
Wed.	6	8.00 N.M.	3.40	Wed.	6	7.22	3.07
Thu.	7	8.00	3.40	Thu.	7	7.22	3.07
Fri.	8	8.00	3.40	Fri.	8	7.22	3.07
Sat.	9	8.00	3.40	Sat.	9	7.17	3.12
Sun.	10	8.00	3.40	Sun.	10	7.17	3.12
Mon.	11	9.50	3.40	Mon.	11	7.17	3.12
Tue.	12	10.10	3.40	Tue.	12	7.17	3.12
Wed.	13	10.40 F.Q.	3.40	Wed.	13	7.17	3.12
Thu.	14	11.00	3.40	Thu.	14	7.17	3.12
Fri.	15	11.20	3.40	Fri.	15	7.17	3.12
Sat.	16	11.50	3.40	Sat.	16	7.12	3.17
		A.M.					
Sun.	17	12.20	3.50	Sun.	17	7.12	3.17
Mon.	18	1.00	3.50	Mon.	18	7.12	3.17
Tue.	19	1.40	3.50	Tue.	19	7.12	3.17
Wed.	20	No L.	No L.	Wed.	20	7.12	3.17
Thu.	21	No L. F.M.	No L.	Thu.	21	7.12	3.17
Fri.	22	No L.	No L.	Fri.	22	7.12	3.17
Sat.	23	7.50 P.M.	9.50 P.M.	Sat.	23	7.07	3.22
Sun.	24	7.50	10.20	Sun.	24	7.07	3.22
Mon.	25	7.50	10.40	Mon.	25	7.07	3.22
Tue.	26	7.50	11.10	Tue.	26	7.07	3.22
Wed.	27	7.50	11.40	Wed.	27	7.07	3.22
Thu.	28	7.50 L.Q.	12.00	Thu.	28	7.07	3.22
Fri.	29	7.50	12.30 A.M.	Fri.	29	7.07	3.22
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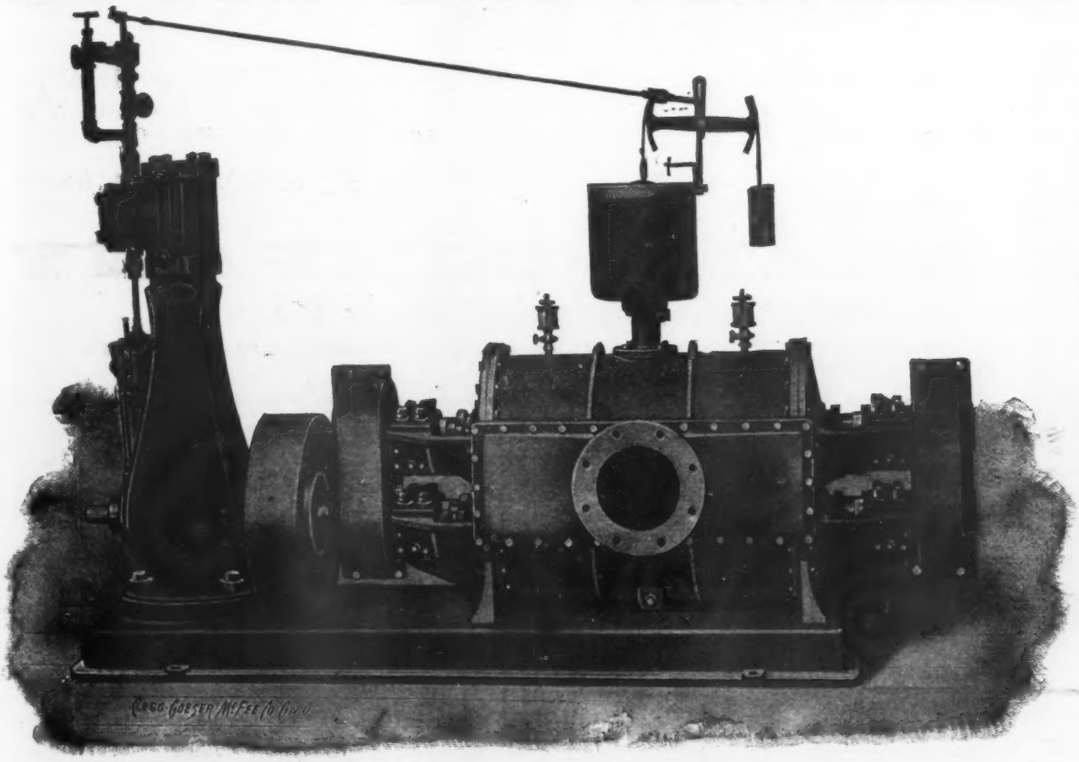

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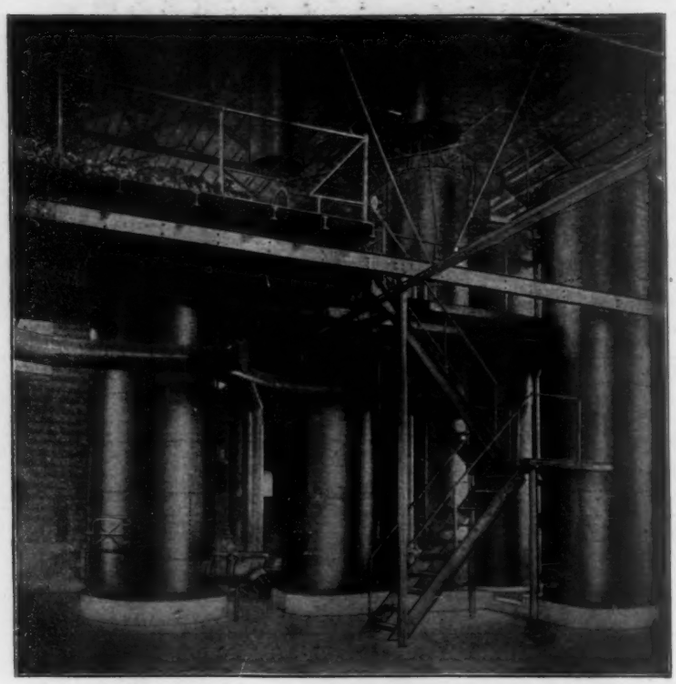

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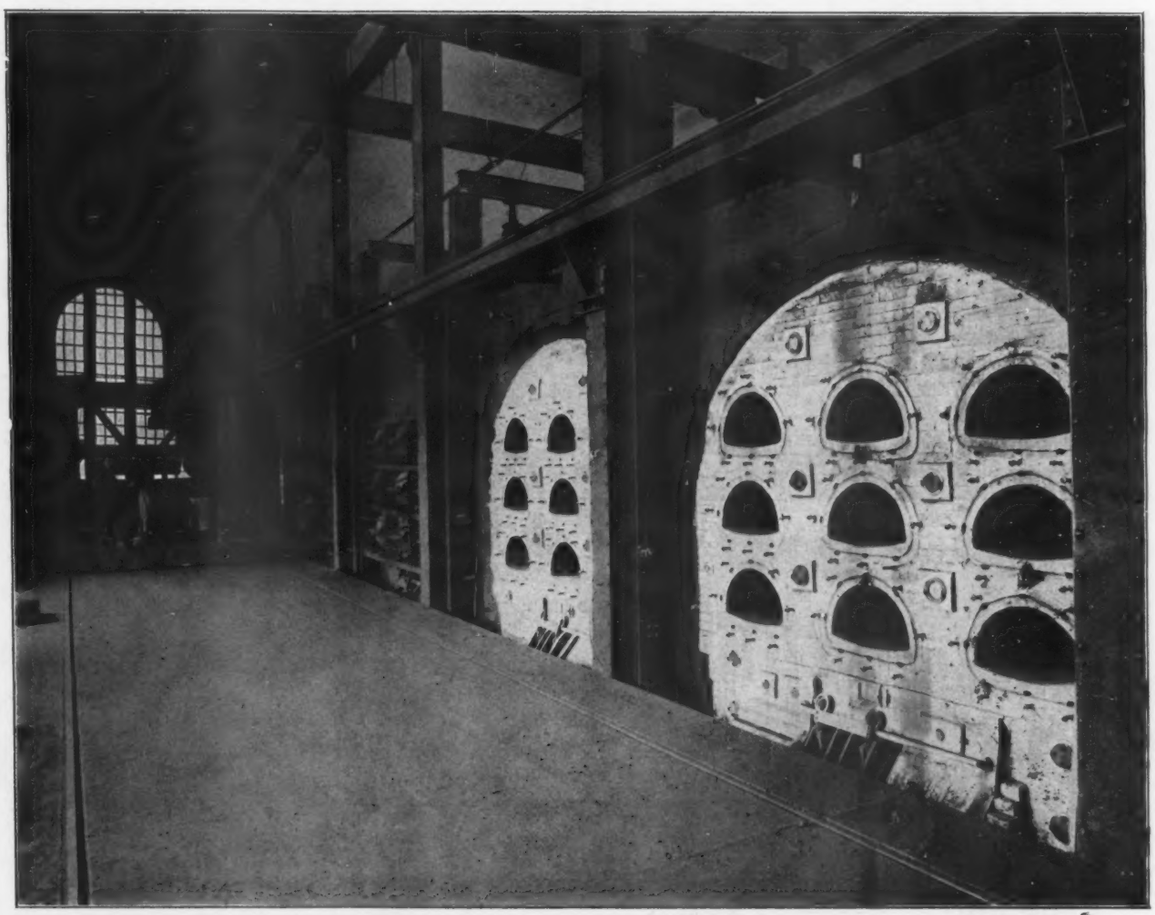

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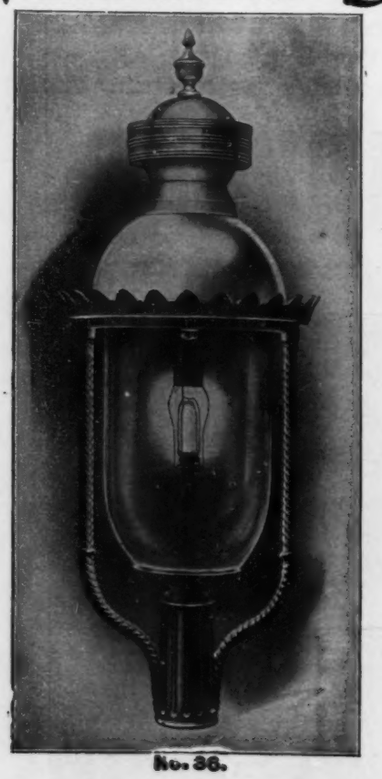

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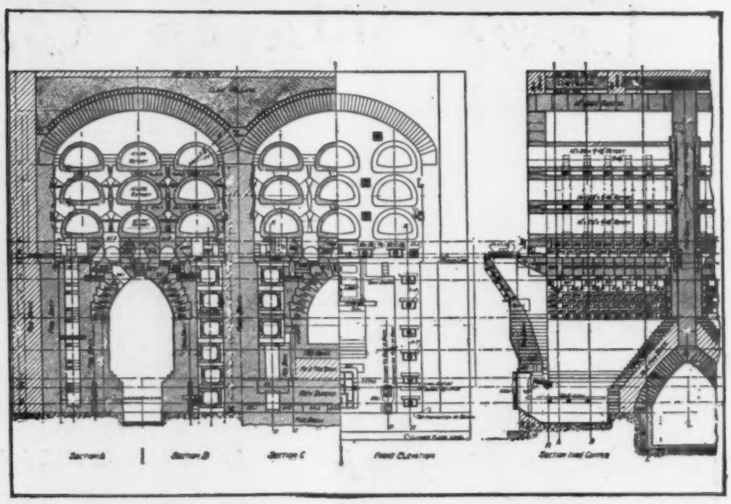

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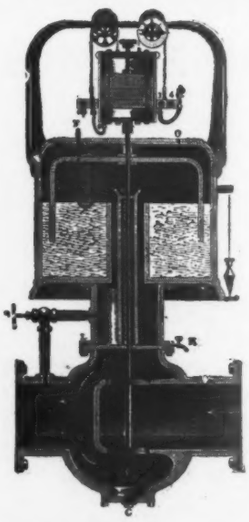

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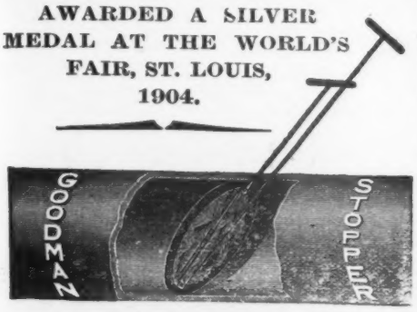

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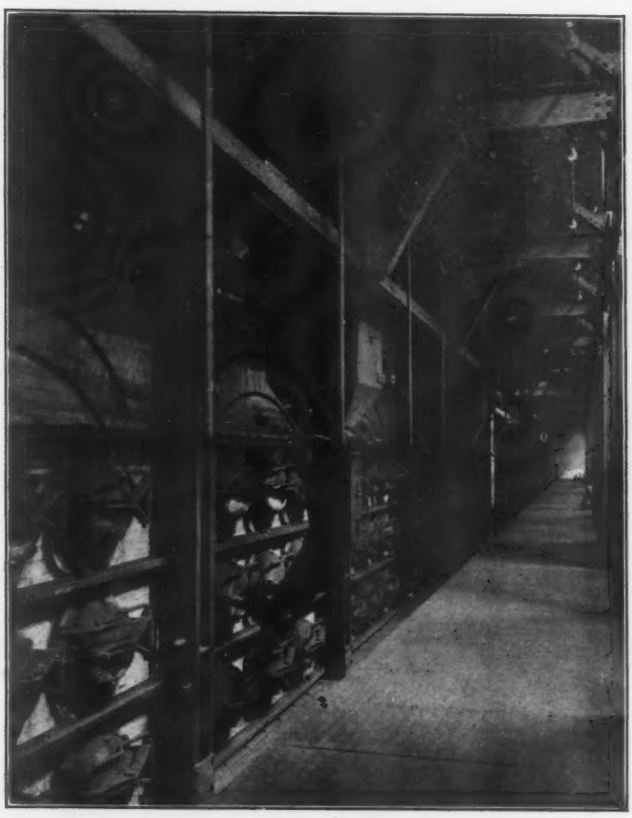

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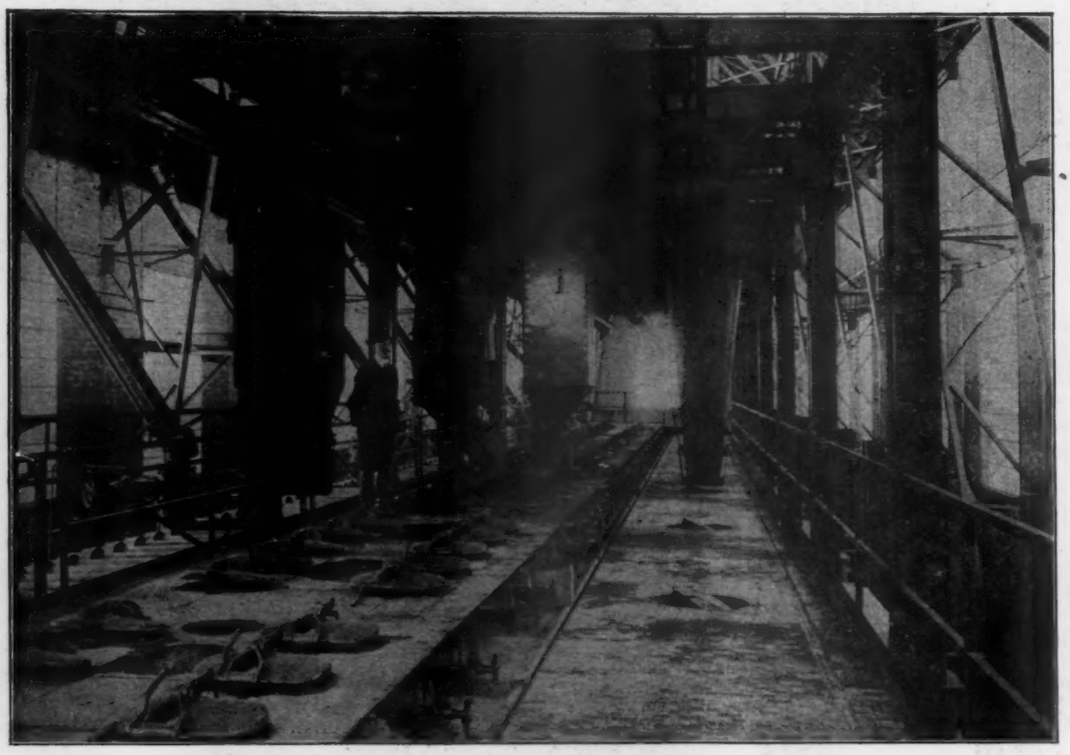

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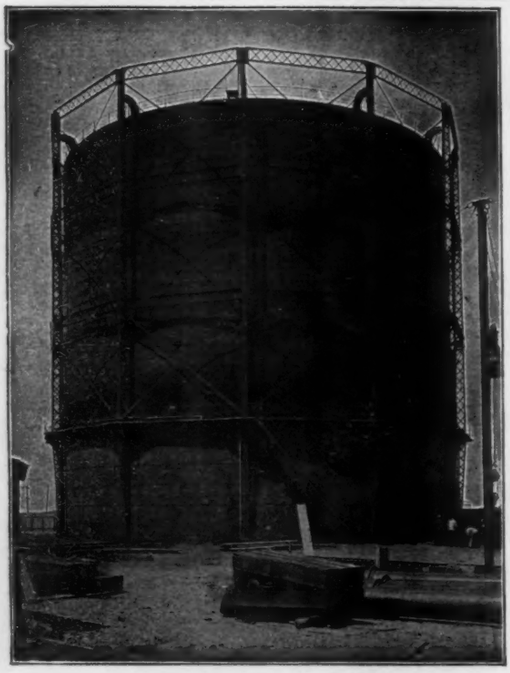

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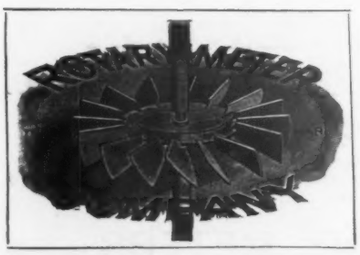

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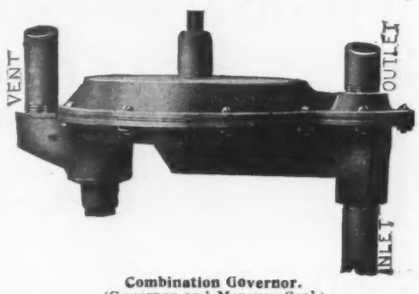

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